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Food Technology Abstracts

Central Food Technological Research Institute, Mysore

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FOOD TECHNOLOGY ABSTRACTS

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Food Reviews International
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Gordian
Grasas y Aceites
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IFST Proceedings
ISI Bulletin
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Indian Baker
Indian Cashew Journal
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Khadigramodyog
Lebensmittel-Wissenschaft und - Technologie
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Meat Science
Memoirs of Faculty of Fisheries Kagoshima University
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Milling & Baking News
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Modern Packaging
Modern Packaging Trends
Mushroom Information
Mushroom Journal
Mysore Journal of Agricultural Sciences
Nature, UK
Netherlands Journal of Agricultural Sciences
Netherlands Milk and Dairy Journal
New Scientist
New York's Food and Life Sciences
New Zealand Journal of Dairy Science and Technology
Nutrition Reports International
Nutrition Reviews
Oils and Oilseeds Journal
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Pakistan Journal of Scientific and Industrial Research
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Peanut Journal of Nut World
Peanut Science
Perfectpac
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Pest Control
Pesticide Biochemistry and Physiology
Pesticide Science
Pesticides
Pesticides Information
Phillippine Journal of Food Science Technology
Phytochemistry
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Plant Science
Poultry Guide
Poultry Science
Poultry Tribune
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Proceedings of the Indian Academy of Science, Section B
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Process Biochemistry
Processed Prepared Food
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Punjab Horticultural Journal
Qualitas Plantarum - Plants Foods for Human Nutrition
Quick Frozen Foods
Quick Frozen Foods International
Report of the National Food Research Institute (Japan)
Research and Industry, India
Revista de Agroquimica Y Technologia de Alimentos
Rice Journal
Riechstoffe Aromen Kosmetica
Science (USA)
Science Reporter
Science and Culture
Sciences
Sciences Des Aliments
Scientific American
Scientific World
Seafood Export Journal
Seed Science and Technology

Seeds and Farms
Solar Energy
Soybean Digest
Starch/Starke
Swedish Journal of Agricultural Research
Tea and Coffee Trade Journal
Technical Quarterly, Master Brewers Association of America
Technology Review
Toxicology
Tropical Agriculture
Tropical Grain Legume Bulletin
Tropical Pest Management
Tropical Stored Products Information
Two and a bud
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Voeding
World Coffee and Tea
World Crops
World Health
World's Poultry Science Journal
Zeitschrift Fuer Lebensmittel-Untersch und Forschung

CONTENTS

ABBREVIATIONS

A	ampere
AAS	atomic absorption Spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm^2, cm^3]
cal	calorie
cd	candela
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetra acetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10^{-15}, as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycle/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lb	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
m	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt	.molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10^{-9}, as in nm]
N	Newton [kg m/s^2]
N.	North, Northern, normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10^{-12}, as in pCi]
P	poise
P	probability
Pa	Pascal [N/m^2]
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride
qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	south, Southern, etc.
s.d.	standard deviation
SDS	sodium dedecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
w	watt
W.	West,Western,etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
µ	micro-[as in g, m]
%:	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

Chemical symbols are used for all elements.

ABBREVIATIONS FOR LANGUAGES

Language of text

Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
spanish	Es
swedish	Sv

GENERAL

1

Carter (ME). **Agriculture Research Service.** Food research in the nineties. *Food Technology* 43(12); 1989; 48-49

This article presents an overview of Agricultural Research Service functions and some of its research programs in food safety, nutrition and quality. SRA

2

Ken Lee.. **Food neophobia.** Major causes and treatments. *Food Technology* 43(12); 1989; 62, 64, 68-70

3

Labuza (PT). **Educations needs in food science in the 21st century.** *Food Technology* 43(12); 1989; 74, 76, 78, 80-81

The state of science education in general is described and role of IFT with respect to food science education is discussed. Covers briefly the plight of science education, where science is growing, problems in food science education, and what IFT should be doing (scholarships and fellowships, and recuritment) and where we must start now. SRA

4

Lawrie (RA). **Food science in the service of industry and consumers.** *Food Australia* 41(8); 1989; 892-895

5

Sapakie (SF), Fulmer (RW) and Behnke (JR). **The future of food industry research and development.** *Cereal Foods World* 34(12); 1989; 1000-1005

FOOD PROCESSING

6

Ajibola (OO). **Thin-layer drying of melon seed.** *Journal of Food Engineering* 9(4); 1989; 305-320

Moisture equilibrium data and thin-layer drying rates for melon seeds at different temp. (40-70 C) and relative humidities (10%-80%) were determined using static gravimetric methods. A non-linear least squares regression program was used to evaluate five desorption isotherm models and three thin-layer drying models. The modified Halsey model gave the least standard error of estimate of 0.4% for equilibrium moisture content and 4.8% for equilibrium relative humidity. None of the three thin-layer drying models used to evaluate the thin-layer drying results was significantly better than the others in predicting drying. The exponential model in which the drying constant is a function of temp. and relative humidity was found adequate for predicting thin-layer drying of melon seed. AS

7

Driscoll (RH) and Potluri (PL). **Drying of grains in humid tropics.** *Food Australia* 41(11); 1989; 1038-1039, 1043

Australia has pioneered a method of drying bulk stores of paddy over long periods of time. This gentle in-store drying method has led to a high quality product after milling, with reduced losses from cracking. Many technologies are used for drying grain in the tropics, but the Australian method of in-store drying offers the greatest potential for increasing current drying capacity and preserving grain quality. AS

8

Lee (HJ), Singh (RK) and Larkin (JW). **Determination of lethality and processing time in a continuous sterilization system containing particulates.** *Journal of Food Engineering* 11(1); 1990; 67-92

A finite difference program was used to simulate an aseptic processing of foods containing particulates. The accumulated lethality at the center of the particle moving through the heat/hold/cool sections of the continuous sterilization system and the min. processing time to destroy 6 D of **Clostridium** sp. PA 3679 and 12 D of peroxidase necessary to prevent regeneration were calculated. Effect of operating conditions and change of thermal properties of particle and fluid on accumulated leathality and required min. processing time is presented. Results indicated that size, shape, thermal properties, and residence time distributions of the particle within scraped-surface heat exchanger (SSHE) and holding tube greatly influenced the accumulated lethality and, subsequently, the min. required processing time. In addition, effects of the overall heat transfer coeff. for both heater and holding tube and the particle surface heat transfer coeff. were found to be significant. AS

FOOD PACKAGING

Packaging materials

9

Eustace (IJ). **Food packaging-selection of**

materials and systems. *Food Australia* 41(5); 1989; 884-885

Aspects to be considered when selecting materials and systems and factors which influence properties of packaging film are addressed in this article. Covers vacuum packaging, factors which affect oxygen transmission rates (comp. of the film, thickness, temp. and RH) and modified atm. packaging. BV

10

Fleurat-Lessard (F). **Resistance of packaging material for foodstuffs to the perforations by stored product insects. 1.** A review of testing methods. *Sciences Des Aliments* 10(1); 1990; 5-16 (Fr).

Most sp. of stored-product insects attack packaged foods. But some sp. are found more dangerous for the perforation of the packaging matter than others. These include cadelle, lesser grain borer, larger grain borer and some Dermestid beetles. With one packaging material the variation in susceptibility to penetration depends on the sp. and stage of the insect involved. Different test are useful to classify the resistance to insect penetration or the time necessary to bore a hole and the insect's ability to make ingress or egress holes. The infested storage test or "Savannah test" is a large scale test consisting in long term storage of different kinds of packaged food inside a big insect-proof store with permanent insect infestation delivered in the free space off the store. The other tests are used for comparisons of different pieces of package material in the lab. They give a better accuracy on the absolute resistance to insect damage but without any possibility of a choice between different packaging materials. The relative resistance to insect penetration of common packaging materials is given with an example of each test procedure. Films vary in susceptibility to penetration depending on thickness, on basic chem. comp., on combination of materials, on structure and on package modelling. Absolute values of resistance of packages are dependant on the choice of a test because resistance to penetration is influenced by the package configuration and the presence of folds, tucks or other refuge sites in the package design. AS

11

Kern (CLJr). **High-performance polyester for food and beverage packaging.** *Food Technology* 43(12); 1989; 93-94

This new polymer provides better oxygen barrier and heat resistance than polyethylene packaging. It may find application in returnable beverage containers because of its temp. resistance to the washing cycles and its better carbonation retention. It could also provide additional shelf-life for smaller carbonated containers. BV

12

Piringer (O). **Ethanol and ethanol/water mixtures as food simulants for the migration out of plastics.** *Deutsche Lebensmittel-Rundschau* 86(2); 1990; 35-39 (De).

The amount of substances migrating from plastics into foodstuffs with high fat contents are in most cases higher than in foodstuffs with high water contents. In most cases this increase in migration is due to the higher solubility of the migrating organic compounds in fat compared to water. The increase in migration is not necessarily due to an increase in the substance's diffusion coeff. due to interactions between the fat and the plastic is often assumed. Ethanol is a good simulant for fatty acids because it has little interaction with many plastics, e.g. polyolefins, migrants are readily soluble in it, and because it is easy to work with analytically. The utilizeable limits of ethanol and ethanol-water mixtures as food simulants are developed from the physical background of diffusion. The use of ethanol and ethanol-water mixtures is supported by published experimental migration results. AS

13

Rooney (ML). **Measuring packaging film attributes.** *Food Australia* 41(8); 1989; 880-881

Plastics

14

Eldman (RAL). **Advances in barrier plastics.** *Food Technology* 43(12); 1989; 91-92

Barrier resins for plastic containers are being modified to improve product protection and make them more cost-effective. Covers fabrication processes (extrusion, injection and others), barrier polymers, modified barrier resins (modified nylons, polyesters, EVOH resins, blend of EVOH with second organic polymeric phase, blend of thin flat mica wafers dispersed uniformally in standard nylon/EVOH barrier resin), and advance needed. SRA

15

Fox (RA). **Plastic packaging.** The consumer preference of tomorrow. *Food Technology* 43(12); 1989; 84-85

16

Matiack (JD) and Gutekunst (RW). **Coinjection as a route to rigid plastic packaging for food.** *Food*

Technology 43(12); 1989; 86-87, 94

Various materials in combination with polyethylene terephthalate (PET) for use in coinjection process is being investigated, and found that coinjection of polyethylene terephthalate with nylon produces containers with better oxygen barrier, similar clarity and equal water vapour protection. SRA

FOOD ENGINEERING AND EQUIPMENT

17

Thorpe (GR), Stokes (AN) and Wilson (SG). **The integral heat of wetting of food grains.** *Journal of Agricultural Engineering Research* 46(1); 1990; 71-76

The object of this work was to obtain analytical expressions for the integral heats of wetting of food grains from Hunter's isostere equation. A numerical algorithm for evaluating the integral has been presented. For the benefit of numerically intensive studies of the processes of heat and mass transfer in the grains the integral heats of wetting have been expressed as fourth order polynomials, polynomial equations for nine types of grains have also been presented. RS

Engineering

18

Barrett (AH), Ross (EW) and Taub (IA). **Simulation of the vacuum infusion process using idealized components:** Effects of pore size and suspension concentration. *Journal of Food Science* 55(4); 1990; 989-993, 999

Vacuum infusion of porous food matrices (i.e., extruded starch crackers) with calorically dense suspensions of food powders in fat was investigated in an ideal system. Exp. involved infusion of model matrices with lipid suspensions consisting of milled, size-characterized sucrose in corn oil. The influence of pore size/particle size ratio and suspension concn. on the penetration of liquid partcles were determined. A mathematical model that allows prediction of future behaviour was fitted to the test results. The model indicates that dry-wt. particle penetration is strongly correlated with pore size and independent of initial particle concn. Infusion of liquid plus particles was increased by raising porosity and lowering particle concn. AS

19

de Alwis (AAP) and Fryer (PJ). **The use of direct resistance heating in the food industry.** *Journal of Food Engineering* 11(1); 1990; 3-27

Direct resistance heating (DRH) offers the chance to process solid and liquid foods at the same rate, avoiding the delay due to thermal conduction which prevents the use of HTST technologies on particulate foods. The attempts to exploit the advantages of DRH in food processing over the last century are reviewed. A successful DRH unit requires non contaminating electrodes which has a good contact with the food material, control of the food heating rate and, if sterilisation is required, an efficient aseptic packaging process. Recent developments in these three areas mean that the advantages of direct resistance heating can now be commercially exploited. AS

20

Ghazala (S), Ramaswamy (HS), van de Voort (FR), Prasher (SO) and Barrington (S). **Evaluation of conduction heating food model for ascorbic acid retention and colour formation during thermal processing.** *Canadian Institute of Food Science and Technology Journal* 22(5); 1989; 475-480

Ascorbic acid retention and colour formation studies were carried out using a conduction heating simulated food model in cylindrical containers subjected to heat processing in a steam retort. Operating conditions, at temp. from 110 to 127 C, were selected to study the influence of various process times/lethalities on the ascorbic acid retention and induced Maillard-type colour formation. Ascorbic acid was analysed by a HPLC technique while the formed colour was evaluated using a Minolta Chroma Meter. The study indicated that a food model of wetted celite could be used for distribution of ascorbic acid and/or colour forming compounds and their subsequent recovery from the medium, both before and after thermal processing. The study also indicated that kinetics of ascorbic acid retention/destruction and colour formation were different depending on whether they were tested individually or in mixtures, and the experimental design provided data for the verification of a computer model for predicting nutrient retention under a range of experimental conditions. AS

21

Gordon (C) and Thorne (S). **Determination of the thermal diffusivity of foods from temperature measurements during cooling.** *Journal of Food Engineering* 11(2); 1990; 133-145

Two techniques are described for estimating the thermal diffusivity of spherical foodstuffs from the temp./time histories during cooling in a medium at constant temp. The first method (the Slope Method) calculated thermal diffusivity from the slope of the cooling curve for the food centre, whilstthe second

method (the Lag Method) uses the max. temp. difference between the centre of the food and a point half way from the centre to the surface. For values of thermal diffusivity between 0.85 x 10^{-7} and 3.23 x $10^{-7}m^2$ S^{-1}, a range which includes almost all foodstuffs, the mean and max. errors were 1.3% and 4.0% by the slope method and 1.2% and 5.3% by the lag method. Additional errors arising from the imprecision of thermocouple location are discussed. The mean and max. difference between values of thermal diffusivity calculated by the two methods for a range of fruits and vegetables were 2.43% and 6.7%. The methods could be modified for foods of other simple geometric, shapes, for examples semi-infinite slabs and cylinders. AS

22

Kokini (JL) and Dervisoglu (M). **Wall effects in the laminar pipe flow of flur-semi-solids foods.** *Journal of Food Engineering* 11(1); 1990; 29-42

The objective of this study was to estimate the contribution of the apparent slip phenomenon to the capillary flow of ketchup, mustard, apple sauce and tomato paste. Q/ P: $R^3\tau w$ calculated at constant wall shear stress was plotted against $1/R^2$. The linearity of these plots suggested that corrected slip coeff. βc. could be calculated from the slopes of the relating lines at specific values of τ_w. Slip velocities could also be calculated as a function of wall shear stress and it was found that a power function of slip velocities could be related to wall shear stress. Omission of slip corrections in rheological measurements of these materials could result in errors of up to 70-80% in their shear rate component. AS

23

Mannapperuma (JD) and Paul Singh (R). **A computer-aided method for the prediction of properties and freezing/thawing times of foods.** *Journal of Food Engineering* 9(4); 1989; 275-304

A numerical method based on enthalpy formulation of heat conduction with gradual phase change was used to develop a mathematical model to simulate freezing and thawing processes in foods of six different geometrical shapes. Another model was developed to predict the thermophysical properties required by the enthalpy formulation. A number of computer programs were written to implement these models. These programs were combined to form a comprehensive package for the computer-aided prediction of freezing/thawing times and properties of foods. The predictions from the program package compared favourably with published experimental data. AS

24

Nunes (RV) and Swartzel (KR). **Modeling thermal processes using the equivalent point method.** *Journal of Food Engineering* 11(2); 1990; 103-117

Evaluation of thermal processes requires accurate treatment of the time-temp. history of exposure. For the Equivalent Point Method (EPM) of thermal evaluation, the effectiveness of five different numerical methods has been assessed for estimation of both the equivalent time and the equivalent temp. The performance of each method was tested with three simulated data sets. The traditional method of Line Intersections resulted in significant error. Both Least Squares Linear Regression and Least Absolute Value Linear Regression yielded only a slight improvement. By contrast, Nonlinear Least Squares Regression and Weighted Least Squares Regression (WLSR) resulted in excellent estimations with WLSR being easier to use. Error analysis demonstrated accurate predictions of concn. changes for constituents over a wide range of activation energies. AS

25

Nunes (RV) and Swartzel (KR). **Modeling chemical and biochemical changes under sinusoidal temperature fluctuations.** *Journal of Food Engineering* 11(2); 1990; 119-132

Chemical and biochemical reactions depend strongly on the time-temp. history in particular, regular temp. fluctuations are very important in shelf-life studies. For sinusoidal temp. fluctuations, a new model is examined covering a wide range of mean temp. (-25 - 50 C), half amplitude (5 - 40 C) and activation energy (40-160 kJ/mol). Not only does this new model approach Arrhenius, closely, but it also includes the reaction order. Based upon the integrated Arrhenius equation, this model yields predictions with errors between one to two orders of magnitude smaller than the widely-used Hicks model. Avoiding numerical integration, accurate shelf-life predictions are possible provided the kinetic constants associated with chemical and biochemical reactions are known. AS

26

Zuritz (CA), McCoy (SC) and Sastry (SK). **Convective heat transfer coefficients for irregular particles immersed in non-newtonian fluid during tube flow.** *Journal of Food Engineering* 11(2); 1990; 159-174

Convective heat transfer coeff. were determined for mushroom shaped aluminium castings immersed in a Power-law pseudoplastic liquid during tube flow. The effect of particle size, fluid flow rate and tube-mean apparent viscosity were investigated. Flow rates were varied from 0.076 to 0.287 kg 3^{-1}

and mean apparent viscosities from 2.08 to 17.70 Pa s (corresponding consistency coeff. ranged from 2.34 to 30.50 Pa S^n and flow behaviour indices from 0.95 yo 0.71 resp.). Convective heat transfer coeff. values ranged between 548 W $m^{-2}K^{-1}$ and 1175 W $m^{-2}k^{-1}$ for the range of particle and fluid variables studied. The convective heat transfer coeff. values increased with increasing particle size and fluid flow rate and decreasing apparent viscosity. A dimensionless Nusselt number correlation (r^2 = 96.92%) was obtained in terms of generalized Reynolds and Prandtl numbers, and particle-to-pipe diameter ratios. AS

Equipments

27

Leclercq-Perlat (M-N), Lalande (M) and Tissier (JP). **A method for assessment of the cleanability of equipment in the food processing industry.** *Sciences Des Aliments* 10(1); 1990; 17-41

Dehumidifiers

28

Mason (RL). **Application of heat pumps to drying food products.** *Food Australia* 41(12); 1989; 1070-1071

A pilot scale heat pump dehumidifier was developed and used to dry a range of food products including Macadamia nuts and herbs. For Macadamia nuts the drying time could be considerably reduced compared to existing methods while for herbs a major improvement in quality resulted. Herbs dried in a heat pump dehumidifier retain better colour and flavour than a commercial sample of dried herbs. BV

Dryer

29

Fernando (T). **Direct fired dryer for foods and by-products.** *Food Australia* 41(12); 1989; 1072

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

30

Al-Kahtani (HA) and Hassan (BH). **Spray-drying of roselle (Hibiscus sabdariffa** L.) extract. *Journal of Food Science* 55(4); 1990; 1073-1076

Hibiscus sabdariffa (Roselle) powder was produced by pilot scale spray-drying using single strength and vacuum concentrated water extract of its calyces. Powders were analyzed for moisture, protein, vitamin C, total soluble solids (TSS), pH, particle size, bulk density, solubility, dispersibility, hygroscopicity, and microbiological status. The lowest inter air temp. (198.5 C) resulted in the product with best protein content (12.43%), retention of vitamin C (82.76 mg/ 100g), and solubility (dissolving in 97 sec); as well as the highest moisture content (3.78%) in the product. The powder showed a noticeable tendency to stick to internal surfaces of the drying chamber particularly with concentrated solutions at higher temp. AS

31

Kunert-Kirchhoff (J) and Baltes (W). **Model reactions on roast aroma formation. VIII.** Volatile reaction products from the reaction of phenylalanine with 2,5-dimethyl-4-hydroxy-3(24)-furanone (furaneol) by cooking in a laboratory autoclave. *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(1); 1990; 14-16

During decomposition of furaneol with phenylalanine in an autoclave, besides a relatively high number of alkylpyrazines, two alkyldihydrofuropyrazines were identified. One of them can be detected in low quantities even if furaneol is substituted by glucose in the reaction. The formation pathway is discussed. AS

32

Kunert-Kirchhoff (J) and Baltes (W). **Model reactions on roast aroma formation. VII.** Specific products of phenylalanine after cooking L-phenylalanine with D-glucose in laboratory autoclave. *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(1); 1990; 9-13

L-Phenylalanine was heated with D-glucose in an aqueous phosphate-buffered solution in a lab. autoclave at 120, 150, and 180 C for 1 h each. Besides numerous, well known sugar degradation products and N-containing heterocyclic compounds, many specific reaction products of phenylalanine were identified by mass spectrometry and by their identity with synthetic compounds. The specific influence of phenylalanine is based on formation of components with benzyl or phenyl residues as characteristic structural elements. A total of 58 specific reaction products of phenylalanine have been identified. Possible formation mechanisms, partly confirmed by additional exp., are discussed. AS

33

Shallenberger (RS). **Introduction to sweeteness chemistry.** *Cereal Foods World* 35(4); 1990; 377-381

This feature article is a brief synopsis of the chemistry of sweeteness which included chemical grouping or structure that are related to sweeteness. PHR

34

Sopade (PA) and Obekpa (JA). **Modelling water absorption in soybean, cowpea and peanuts at three temperatures using Peleg's equation** *Journal of Food Science* 55(4); 1990; 1084-1087

Peleg's equation was used to model moisture sorption in soybean, cowpea and peanuts at 2 , 25 and 40 C. Peleg K_1 varied with temp. while Peleg K_2 was not relatively affected. Peleg K_2 could be used as a water absorption. Values of K_1 and K_2 were predicted for each of the cvs of the legumes studied. There was no significant (P 0.05) differences in either K_1 or K_2 value for both the dehulled and undehulled peanuts. Peleg equation with the predicted constants gave fairly good fit for water absorption in the legumes. AS

Chemistry(Analytical)

35

Bednasski (W), Jedrykauski (L), Hammond (EG) and Nikolou (ZL). **A method for the determination of α-dicarbonyl compounds.** *Journal of Dairy Science* 42(10); 1989; 2474-2477

An HPLC method for the estimation of a-dicarbonyls, glycoxal, methylglyoxal and diacetyl is reported. Methanol:water mixture was used as a mobile phase. Estimated values of α-dicarbonyls from market cheese samples as well cultures have been reported. JSS

FOOD MICROBIOLOGY AND HYGIENE

36

Corlett (DAJr). **Microbiological safety considerations in refrigerated convenience foods.** *Cereal Foods World* 34(12); 1989; 980-982

This paper discusses the emergence of a new class of foods, potential microbial hazards, hazard due to partial heat process and foods not heat processed, new set of rules, and evolution of new rules. BV

Ethyl alcohol

37

Kida (K), Asano (SI), Yamadaki (M), Iwasaki (K), Yamaguchi (T) and Sonoda (Y). **Continuous high-ethanol fermentation from cane molasses by an flocculating yeast.** *Journal of Fermentation Technology (Hakko Kogaku Zasshi)* 69(1); 1990; 39-45

Repeated-batch fermentation by a flocculating fusant **Saccharomyces cerevisiae** HA2, was done in a molasses medium that contained 20% (w/v) total sugar, at 30 C in an automatically controlled fermentor, and the effect of ethanol concn. on the specific growth rate and the specific production rate of ethanol were studied. Both the specific growth rate and the specific production rate of ethanol fell with increase of ethanol concn. and there was a linear correlation between each rate and the concn. of ethanol. The max. specific growth rate (MU_{max}) and the max. specific production rate of ethanol (q_{max}) were 0.12 h^{-1} and 0.1 g ethanol/10^9 cells h, resp. The specific growth rate and specific production rate of ethanol fell to zero at ethanol concn. of 89 g/l and 95 g/l, resp. The number of viable cells calculated from the linear inhibition equation, was 1.3 x 10^9 cells/ml for production of 85 g/l ethanol at a dilution rate (D_l) of 0.2 h^{-1}. Based on this estimation, a lab.-scale continuous fermentation, using two fermentor in series, was done. In the second fermentor, 85 g/l ethanol was produced at a dilution rate (D_l) of 0.2 h^{-1} by the active feeding of the fermented mesh from the first fermentor into the second fermentor by pumping (hereafter called active feeding). To maintain the number of viable cells above 10^9 cells/ml in the second fermentor, a active feeding ratio of more than 23% was required. Under these conditions, 81 g/l ethanol was produced in the second fermentor at a dilution rate (D_l) of 0.25 h^{-1}, and the high ethanol productivity of 20.3 g/l h could be achieved. A bench-scale continuous fermentation, using two fermentor in series, with a active feeding ratio of 25% was done. An ethanol concn. of 84 g/l in the second fermentor at a dilution rate of 0.25 h^{-1} was achieved, just as it was in the lab.-scale fermentation test. AS

38

Watanabe (T), Aoki (T), Honda (Y), Taya (M), Kobayashi (T). **Production of ethanol in repeated-batch fermentation with membrane type bioreactor.** *Journal of Fermentation Technology (Hakko Kogaku Zasshi)* 69(1); 1990; 33-38

The average ethanol content in sake is 14 wt % continuous production of such a high ethanol content was found not to be stably maintained in a packed-bed bioreactor with immobilized yeast cells, used normally for production of an ethanol content of up to 10 wt %. However, use of repeated-batch

ethanol fermentation incorporating a membrane filter for product separation enabled a high ethanol content and improved productivity to be achieved. In this bioreactor, the yeast cells were retained within the bioreactor and a high yeast concn. was possible. A filtrate containing 14 wt % ethanol was obtained steadily after each batchwise operation. At a yeast concn. of 110 g/l, an ethanol productivity of 3.5 g/l/h was attained, which is 9 times higher than that in conventional batch fermentation. A mathematical model is proposed for assessment of the repeated-batch fermentation process. The estimated results agreed well with the observed ones. With a view to the application of this system to sake production, the aroma components of the filtrate were assayed and compared with those of a commercial grade sake. AS

Microorganisms

Algae

39
Schlipalius (LE). **Beta-carotene from algae.** *Food Australia* 41(5); 1989; 742-745

Hypersaline algae cultivation from the production of beta-carotene for food colour and dietary supplement is discussed. Occurence of beta-carotene and carotenoids, source of beta-carotene, the alga **Dunaliella salina**, and the whyalla development, beta-carotene products, beta-carotene food colours and production of 30% crystalline natural beta carotene are covered. BV

Bacteria

Acetobacter xylinum

40
Blazejak (S) and Sobczak (E). **Bioconversion of glycerol into dihydroxyacetone (DHA) using Acetobacter xylinum.** *Acta Alimentaria Polonica* 14(2); 1988; 207-216

The objective of this research was to compose a medium for microbiological conversion of glycerol into dihydroxyacetone (DHA). It was found that the selected strain, **Acetobacter xylinum**, ensures a ca. 80% yield in the process (i.e. it produces over 8% of DHA from 10% glycerol). It also displays a number of practical advantages, the most important of which is the facility of its extraction from post fermentation fluids, a factor of crucial importance in the production of pure preparation applicable in medicine or various branches of industry. AS

Escherichia coli

41
Lucas (F) and Ducluzeau (R). **Antagonistic role of various bacterial strains from the autochthonous flora of gas-free mineral water against Escherichia coli.** *Sciences Des Aliments* 10(1); 1990; 65-73

An inoculum of **E. coli** was found to disappear more rapidly from mineral water of Vittel "Grande Source" containing an autochthonous bacterial flora than from the same water sterilized by filtration at the time of sampling. This antagonistic effect of water on **E. coli** varied with the age of the inoculum, but did not seem to be related either to the length of storage of water or to the initial numbers of the autochthonous flora or to the type of bottle. By contrast, variability in the antagonistic effect of water samples resulted from the presence in their autochthonous flora of bacterial strains belonging to various genera and sp., more or less active separately. AS

Leuconostoc oenos

42
Tourdot (R), Schmitt (P), Divies (C) and Cavin (JF). **Preliminary studies about transport mechanism of malic acid in Leuconostoc oenos.** *Sciences Des Aliments* 10(1); 1990; 99-106

The malolactic activity of **Leuconostoc oenos** is rate-limited by malic acid uptake. Mutagenesis of a **Leuconostoc oenos** strain with nitrosoguanidine had permitted to distinguish two kinds of malate negative mutants. Three mutants did not found again malolactic activity (MLA) after permeabillization and one mutant recovered an intracellular activity comparable with the one of the parent strain suggesting that only the system of malate transport was affected. The optimal activity of intact cells at low pH and the pronounced inhibitory effect of agents which abolish proton gradients suggest that malic acid transport would be mediated by a pH-permease-type system ATP-dependent. AS

Listeria

43
Cox (LJ). **A perspective on listeriosis.** *Food Technology* 43(12); 1989; 52, 54-59

This article presents a perspective on listeriosis to help correcting some misconceptions of the disease. Discusses whey 'New' pathogens emerge, epidemiology and etiology of listeriosis (foodborne disease, cross-infection, cross-contamination,

underestimated incidence) increased incidence, and recomendations to ensure the public safety. BV

Streptococcus thermophillus

44

Yondem (F), Oailgen (M) and Bozoglu (TF). **Growth kinetics of Streptococcus thermophillus** at subbacteriostatic penicillic G concentrations. *Journal of Dairy Science* 42(10); 1989; 2444-2451

Penicilin G at concn. level of 3 and 6 mgm/L of liquid media were used as a sub bacterial concn. and growth kinetics studied. The kinetics were compared with methematical models normally used in the biochemical engineering research. A modified logistic equation was employed to simulate growth with penicillin G stock. JSS

Fungi

45

Sadler (M). **Myco-protein makers.** *Food Technology in New Zealand* 25(1); 1990; 6-7

Regulatory authorities conducted tests for 10 yrs and approved Quorn (myco-protein) (**Fusarium graminearum**) as safe human food. Results of allergenicity tests and tolerance studied in human volunteers showed no evidence of intolerance reactions. Quorn is a highly versatile food whose textural properties are not affected by freezing and cooking. It has good eating quality, pleasant taste, and status as a healthy food. Stir-fries, other international dishes, potato-topped pie, flans, salads, pies and casseroles and var. available as manufactured products in market using quorn. SRA

Aspergillus aculeatus

46

Adisa (VA). **Lipolytic activities of two strains of Aspergillus aculeatus** associated with the spoilage of two food sources. *Die Nahrung* 33(4); 1989; 325-331

The production of extracellular lipolytic enzymes by 2 strains of **Aspergillus aculeatus** associated with the deterioration of peanuts and a marked margarine in Nigeria and the effects of temp. and pH on the activities of the enzymes were investigated. Lipolytic enzymes were detected within 2 days of incubation at 35 C in 4 and 6 natural oils and in 3 out of 4 synthetic glycerides used irrespective of strain type. The lipolytic enzymes of both strains hydrolysed both natural oils and synthetic glycerides to free fatty acids. There was correlation between the mycelium produced to the quantity of free fatty acids produced in medium within the first 8 days of incubations. There was a general increase in mycelium production with increase in incubation period. The enzyme activities were at peak at 30-35 C and pH 6-7. AS

Yeasts

47

Rajcheva-Roshkova (ZG), Djukiandjiev (SV) and Pavlova (KI). **Fractionation and characterization of yeast proteins.** *Die Nahrung* 33(4); 1989; 319-323

Fractional profile of proteins from baker's, brewer's and alcoholic yeasts was studied, applying a consecutive treatment of commercial biomasses, with solutions with a gradient of ionic strength and pH. It was found that a large part (35-50%) of total proteins from investigated biomasses is extracted by means of 0.01 M KCl, pH 7.0, which together with proteins extracted by means of 0.65 M KCl, pH 9.5, makes the part of the easily extractible proteins (50-64% of total protein amount). The remaining part of proteins is extracted by means of alkaline solutions only. The aminoacid comp. of the isolated fractions indicated that they are suitable for usage as food product ingredients. AS

BIOTECHNOLOGY

48

Fan (L-S), Leyva-Ramos (R), Wisecarver (KD) and Zehner (BJ). **Diffusion of phenol through a biofilm grown on activated carbon particles in a draft-tube three phase fluidized-bed bioreactor.** *Biotechnology and Bioengineering* 35(3); 1990; 279-286

Diffusion of phenol through a biofilm attached to activated carbon particles was investigated. The biofilm was grown on activated carbon particles in a draft-tube three-phase fluidized bed bioreactor operating in a fed-batch mode. It was found that phenol did not adsorb on the biofilm and that the diffusion coeff. of phenol within the biofilm varied from 13 to 39% of its corresponding value in water. The diffusion coeff. of phenol within the biofilm was reduced by increasing the biofilm density. An extensive literature review of diffusion of substrates through biofilms indicated that this conclusion could be extended to biofilms grown on flat surfaces, rotating cylinders, and even bioflocs. AS

TISSUE CULTURE

49

Bailey (CM) and Nicholson (H). **Optimal temperature control for a structured model of plant cell culture.** *Biotechnology and Bioengineering* 35(3); 1990; 252-259

This article calculates optimal open-loop temp. trajectories that maximize the average rate of product synthesis of a plant cell culture. It uses a previously published five-state mathematical model which describes the growth and product synthesis of a batch plant cell suspension culture of **Catharanthus roseus** under temp. control. The optimal open-loop temp. maximize the final product concn. for predefined fermentation periods. A single switch in temp. is shown by computer simulation to be near optimal, with a 22% increase in final product yield over that obtained at the optimal constant temp. Examination of the achieved final product yield as a function of fermentation period allows this period also to be chosen optimally. This time is reduced from 16 days in the constant temp. case to 12 days in the switched temp. case. AS

FOOD ADDITIVES

50

Gaber (C) and Maier (HG). **Acids of the chicory root. 1.** Changes in the contents of the main acids with different degrees of roast. *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 189(5); 1989; 443-447 (De).

The main acids in two samples of dried chicory, two series of roasted chicory with different degrees of roast, two industrial roasted products and one commercial sample were determined by HPLC. The content of malic and citric acid decrease with increasing degree of roast; those of formic, acetic, quinic, lactic, hydroxyacetic acid and high-molecular-mass acids increase in the range of normal degrees of roast. The content of phosphoric acid decreases slightly; that of pyroglutamic acid decreases strongly. Quinic, hydroxyacetic, pyroglutamic acid and the high-molecular-mass acids have been determined for the first time in chicory. By means of these detn., only 54-64% of the contents of all acids present in chicory are estimated. The remaining may be minor acids, trace acids and acid esters. AS

Colourants

51

Spears (K) and Marshall (J). **Qualitative analysis synthetic colourings in food.** *Journal of the Association of Public Analyst* 25(2); 1987; 47-54

Synthetic colourings may be extracted from aqueous or readily soluble foods using a SEP-PAK (R) sample preparation cartridge or from more complex foods using a liquid anion exchange solution in butanol. In both cases, permitted synthetic food colourings may be tentatively identified by thin-layer chromatography. Natural colourings did not cause interference in the extraction or identification stages. The method is suitable for rapid screening of foods for quality control purposes. AS

Flavours

52

Chang (SS). **Food flavours.** *Food Technology* 43(12); 1989; 99-106

Type of flavours, characteristics and occurrence in foods, regulation, flavour research (sample selection, isolation concn. and preliminary fractionation, synthesis of the aromatic compound, confirmation of identification, data interpretation), application of flavour research, constraints in food research are summerised in this article. SRA

Preservatives

53

Seth (V) and Chug (J). **Low sodium dietetic preserves for hypertension.** *Indian Journal of Nutrition and Dietetics* 25(12); 1988; 380-383

Recipes have been developed and standardised for low sodium spicy preserves and acceptability by hypertensive and normotensive subjects was evaluated. Four preserves prepared were tomapple mix; tangy carrots; spice-n-sweet papper; and hot-n-sour chillies. Acceptability of these products was done by sensory evaluation panels comprising of 10 hypertensive and 10 normotensive subjects using 6-point Hedonic scale. The mean scores for overall acceptability were found high to moderately high and ranged from 5.1 to 5.6 for the hypertensive and 4.6-5.3 for normotensives. The scores for quality also showed fairly good acceptability of the products by both the groups. Na content of the products ranged from 0.24 to 1.38 mg/5 g serving portion; the K and energy contents were also calculated. The products preserved well for 3 months under refrigeration. KAR

Stabilizers

Gums

54
Sanderson (GR), Bell (VL) and Ortega (D). **A comparison of gellan gum, agar, K-carrageenan, and algin.** *Cereal Foods World* 34(12); 1989; 991-998

This comparative study indicated that gellan gum has the potential to replace agar, K-carrageenan, and algin, in some applications, especially agar and K-carrageenan. However, its real potential is as a novel gelling agent, capable of providing genuinelly new product opportunities for the food industry. BV

Sweeteners

55
Stamp (JA). **Sorting out the alternative sweeteners.** *Cereal Foods World* 35(4); 1990; 395-400

This feature article reviews the alternative sweeteners already in commercial use in the USA, such as saccharin, aspartame, accesulfame-k. It also discusses potential of new structure like cyclamates, sucralose, thaumatin, glycyrrhizin and sterioside. PHR

Sucrose

56
Yadshall (MA). **Use of sucrose on a sweetener in foods.** *Cereal Foods World* 35(4); 1990; 384-389

This review article deals with various types and forms of sugars and their application in foods such as confectionery, bakery products, icing and glazes, fruit products, condiments and beverages etc. PHR

CEREALS

57
Ang (HG), Kwik (WL), Lee (CK) and Theng (CY). **Direct extrusion puffing of mixtures of high protein cereals.** Nutritional and quality characteristics. *Food Australia* 41(11); 1989; 1030-1033

Extrusion cooking of mixtures of corn, mungbean and soybean grits gave well expanded and highly nutritious products with protein contents (17.2-19.5%) much higher than those of most comparable commercial snack products (7.0-8.3%) and with a more balanced amino acid pattern. The high screw speed (420 rpm) of the extruder caused high lysine loss but only minor losses in other amino acids. Taste panel evaluation of the experimental products showed them to be highly acceptable when compared to commercial products. AS

58
Englyst (HN), Cummings (J) and Wood (R). **Determination of dietary fibre in cereals and cereal products-collaborative trials. Part II.** Study of a modified englyst procedure. *Journal of the Association of Public Analyst* 25(3); 1987; 59-71

59
Englyst (HN), Cummings (J) and Wood (R). **Determination of dietary fibre in cereals and cereal products collaborative trials. Part III.** Study of further simplified procedures. *Journal of the Association of Public Analyst* 25(3); 1987; 73-110

60
Ranum (PM) and DeStefanis (VA). **Bleaching of flour and dietary fiber products.** *Cereal Foods World* 34(12); 1989; 984-985, 988

Aspects covered include, traditional preference for white flour and bread, sources of colour in bread, bleaching wheat flour, enzymatic bleaching factors affecting the use of benzoyl peroxide and bleaching of dietary fibers. BV

Barley

61
Hayes (PM). **Assessment of resazurin staining as a predictor of malting quality in winter and spring barley.** *Journal of the Institute of Brewing* 96(2); 1990; 65-67

Ten spring habit and seven winter habit barley genotypes were tested for their malting qualities with resazurin a redox indicator. The test was conducted on sound, germinated and malted barley with 0.0125% of resazurin solution, and the colour changes in the resazurin solution was noted after 3, 6 and 24 h of treatment. Based on the enzymatic activity of barley, the reduction in the intensity of resazuric colour was observed and which inturn is related to the malting quality of barley. Winter and spring barley genotypes differ in the rate and degree to which they reduce the resazurin solutions. Although, the test is simple and could be of little use in predicting malting quality, it may only be useful in screening of commercial lots and for true evaluation. NGM

62

Holmes (MG). **The influence of sample preparation and grain moisture on the zeleny-SDS sedimentation test when applied to barley.** *Journal of the Institute of Brewing* 96(2); 1990; 75-80

The influence of moisture content of barley at the time of grinding on the fineness of resultant flour and subsequently on the zeleny-sedimentation values was studied. Study indicated that the specific sedimentation vol. were not only dependent on the protein content of the meal but also on the method of preparation of meal and fineness of meal. Therefore, it is suggested that, the samples should be equilibrated to same moisture level before subjecting to zeleny-SDS test. Variations in moisture content from 10.5-13.9% are sufficient to change ranking. Among the various methods used for test, pearling and binding appears to be most suitable method. It is suggested that the sedimentation test could be used to screen barley for their malting qualities. NGM

Rice

63

Chrastil (J). **Chemical and physico-chemical changes of rice during storage at different temperature.** *Journal of Cereal Science* 11(1); 1990; 71-85

The study of three typical N. American var., of rice grains (long, medium and short) stored at different temp. revealed an extensive influence of storage on physicochemical and functional properties of the rice. Swelling and water absorption of rice grains increased during storage. Bulk density of rice flours and gas retention of the doughs also increased. Colour intensity of flours greatly increased. On the other hand, the average particle size of flours milled under the same conditions decreased during storage. A new simple method for measuring stickness of cooked grains based on mathematical analysis of distribution curves of cooked clusters was developed. The stickness greatly decreased during storage. Cooked medium rice grains were more sticky than long or short grains. All these changes were more pronounced at higher storage temp. AS

64

Joseph (EW), Liuzzo (JA) and Rao (RM). **Development of wash and cook-proof methods for vitamin enrichment of rice grains.** *Journal of Food Science* 55(4); 1990; 1103, 1107

Rice grains were simultaneously enriched with vitamin (niacin, thiamin, riboflavin, and pyridoxine) mixes and cross-linked under acidic and alkaline conditions using acetaldehyde and epichlorohydrin, resp. Results indicated that acidic cross-linked grains absorbed more vitamins than corresponding alkaline cross-linked rice ($p < 0.05$). The acidic-linked rice retained the vitamins even after severe washing. Cooking and canning reduced vitamin levels in the unenriched rice below those in the unprocessed (raw) samples ($p < 0.05$) conversely, enriched samples retained significantly ($p < 0.05$) higher levels than the untreated control. Data from the cooking/canning processes suggested that the acidic cross-linking/enrichment treatments allowed the vitamins to penetrate the surface of the rice grains. AS

65

Watanabe (M), Yoshizawa (T), Miyakawa (J), Ikezawa (Z), Abe (K), Yanagisawa (T) and Arai (S). **Quality improvement and evaluation of hypoallergenic rice grains.** *Journal of Food Science* 55(4); 1990; 1105-1107

The colour of hypoallergenic rice grains, produced by an enzymatic process was improved by treatment with diluted hydrochloric acid and washing with water. The acid-treated grains were steamed at the surface layer to prevent breakage. Textural evaluation showed the cooked hypoallergenic rice grains had a favourable stickiness/hardness ratio. AS

Rice flour

66

Stucy Johnson (FC). **Characteristics of muffins containing various levels of waxy rice flours.** *Cereal Chemistry* 67(2); 1990; 114-118

Muffins produced using 5, 15 and 25% replacement levels of waxy rice flour for wheat flour tested by a trained sensory panel showed significant differences between the products containing rice flour and the reference standard for six of the nine evaluated characteristics. But all products were repeated at least a moderately close match to the reference standard with respect to tenderness, vol. and flavour characteristics. The muffins containing 5% waxy rice flour was significantly taller compared to other muffins and reference studied. All waxy rice products retained more moisture during baking. Also showed reduced characteristics of the exterior and the lightness of the interior. AR

Rice starch

67

Archer (AW). **The adulteration of white pepper with rice starch.** *Journal of the Association of Public*

Analyst 25(2); 1987; 43-46

A standard for white pepper is proposed to prevent the addition of adulterants, particularly rice starch; the recommended standard is that undried white pepper should contain not less than 3.5%. trans-trans piperine and that the ratio of K to Ca should be not more than 0.45 on a wt. basis. The proposed standard is not applicable to black pepper. AS

Wheat

68

Glenn (GM) and Saunders (RM). **Physical and structural properties of wheat endosperm associated with grain texture.** *Cereal Chemistry* 67(2); 1990; 176-182

A method of sectioning raw wheat grain was developed to characterize the physical and structural properties of endosperm tissue from hard and soft wheat var. The thinnest possible cross section that remained intact was taken as a measurement of cohesiveness. Hard wheat sections typically were pliable, cohesive, and could be sliced less than 1 MUm thick. Soft wheat sections less than 4 MUm in thickness tended to crumble. Section thickness was used to classify 152 wheat samples using classification discriminant analysis. Structural features of the endosperm matrix that influenced cohesiveness were studied in the cross-sectional surfaces of wheat using scanning electron microscopy. Differences in cohesiveness within a sample were largely accounted for by intracellular space. Differences in cohesiveness of hard and soft wheat grains generally involved continuity of the protein matrix as well as starch-protein adhesion. A 15 kDa polypeptide from sodium dodecyl sulphate-extracted starch was evident only in soft wheat samples. Nevertheless, the intensity of the 15-kDa polypeptide did not reflect the textural hardness of wheat endosperm. AS

69

Lookhart (GL) and Bietz (JA). **Practical wheat varietal identification in the United States.** *Cereal Foods World* 35(4); 1990; 404-407

Progress in methods for identification of wheat var. such as starch gel electrophoresis, polyacrylamide gel electrophoresis (PAGE), sodium dodecyl sulphate(SDS)-PAGE, ion exchange chromatography gel-filtration chromatography, high performance liquid chromatography (HPLC), reverse phase (RP)-HPLC and size sxclusion (SE) HPLC, were reviewed. The advantages as well as disadvantages of different methods were discussed.

PHR

70

Lukow (OM), Zhang (H) and Czarnechi (E). **Milling rheological and end use quality of Chinese and Canadian spring wheat cultivars.** *Cereal Chemistry* 67(2); 1990; 170-176

Ten spring wheat cvs from the People's Republic of China and four spring wheat cvs from Western Canada were compared by using a wide range of milling, rheological, baked bread, and steamed bread properties. Significant cvs differences were observed for all measured traits. Whether assessed by Canadian or Chinese standards, overall performance or ranking of the cvs was similar, indicating that the same factors determine quality for baked or steamed bread. Quality parameters were examined for their effect on steamed bread and correlation and regression coeff. are presented. Protein content and gluten strength were the most important factors determining steamed bread quality. Stepwise multiple regression of steamed bread parameters on quality parameters as independent variables indicated that from 27 to 95% of the variability in steamed bread quality can be explained by protein content and dough mixing strength parameters. Preliminary evidence suggest that the electrophoretic detn. of high mol. wt. glutenin and gliadin proteins might be used to predict steamed bread quality. AS

71

Panozzo (JF), O'Brien (L), MacRitchie (F) and Bekes (F). **Baking quality of Australian wheat cultivars varying in their free lipid composition.** *Journal of Cereal Science* 11(1); 1990; 51-57

A three-yr study was undertaken to investigate the relationship between baking quality and hexane extractable free lipids. The free lipid (FL) was further fractionated by column chromatography into non-polar (FNL), glycolipids (FGL) and phospholipids (FPL). The sum of FGL and FPL was defined as the total polar lipid (FPoL). In all yrs the FL and FNL were the two fractions which gave the highest correlations with loaf vol. and those for the polar fractions were generally less significant. Normalising the data to remove the complicating effects of protein caused the relationship between polar lipids with loaf vol. to become highly significant. Multiple linear regression equations were developed using protein content and lipid comp. to predict loaf vol. and these could be used by wheat breeders as an early generation screening test. AS

Wheat bran

72

Sarojani (KD) and Maya (P). **A novel food snack containing wheat bran.** *Indian Journal of Nutrition and Dietetics* 25(7) 1988; 229-233

A high fibre snack (HFS) was prepared by using whole wheat flour, roasted wheat bran, cumin, gingelly, cinnamon, salt and sugar. This chapathi like HFS was cooked or roasted; it contained 5.5% fat, 44.0% fibre and 14.1% protein. It could be preserved for 14-16 wk and it can fit into any meal of the day or can be consumed independently as a snack. KAR

Wheat proteins

73

Kazemie (M) and Bushuk (W). **Identification of a unique group of high molecular weight proteins in some wheat varieties.** *Cereal Chemistry* 67(2); 1990; 148-150

A unique group of high mol. wt. proteins, similar in mobility to the high mol. wt. subunits of glutenin, was identified by sodium dodecyl sulphate-polyacrylamide gel electrophoresis in some Canadian wheat var. These proteins are extractable from flour or gluten with acetic acid and with acetic acid/urea solutions. They were not extracted with traditional solvents used for glutenin extraction that contain detergents such as cetyltrimethylammonium bromide or sodium dodecyl sulphate/2-mercaptoethanol. AR

74

Kruger (JE) and Marchylo (BA). **Analysis by reversed phase high performance liquid chromatography (RP-HPLC) of changes in high molcular weight (HMW) subunit composition of wheat storage protein during germination.** *Cereal Chemistry* 67(2); 1990; 141-147

The study of the breakdown of HMW glutenin subunits in Neepawa wheat, examined over a five day germination period using RP-HPLC technique along with SDS-gradient PAGE showed that the amount of HMW glutenin subunits extracted into 50% 1-propanol containing 1% DTT decreased throughout germination, where they remained nearly constant in wheat extracted into 50% 1-propanol. The subunits 9 and 10 gradually disappeared. But subunits 5 and 10 from 50% 1-propanol extractant, showed the greatest increase during germination. It was shown that the ratio of HMW glutenin subunits is propanol) extracts to those present in propanol)-DTT and propanol)-DTT-HAC extracts is inversely related to dough strength. This could be an indicator of decreased dough strength known to occur in flours originating from pre-harvest sprout damaged wheat. AR

75

Schanen (PA), Pearcz (LE), Davis (EA) and Gordon (J). **Hydration of whey protein wheat starch systems as measured by electron spin resonance.** *Cereal Chemistry* 67(2); 1990; 124-128

Hydration of whey protein conc. (WPCs) individually and in combination with wheat starch was studied using a stable, nonhydrogen bonding, free radical probe and electron spin resonance measurement techniques. WPCs with two different protein-lactose ratios were used. Measurements were made at room temp. and after heating to 75 and 95 C. In WPC-water systems, some slowed motion was observed, as well as a partition of the probe into hydrophobic and hydrophilic environments. The hydrophobic environment increased relative to the hydrophilic environment as a consequence of heating or increasing protein concn. Spectra for the combined WPC-wheat starch systems showed elements of the individual components; namely, slowed motion (WPC and starch contributions) and hydrophobic-hydrophilic environment partition (WPC contribution). WPC and wheat starch did not appear to compete for water. AS

76

Singh (NK), Donovan (GR), Batey (IL) and Mar Ritchie (F). **Use of sonication and size-exclusion high performance liquid chromatography in the study of wheat flour proteins. I.** Dissolution of total proteins in the absence of reducing agents. *Cereal Chemistry* 67(2); 1990; 150-161

Total proteins from a very strong wheat flour, 'Mexico 8156' were almost completely extracted without chem. reduction of disulphide bonds by applying mechanical shear with an ultrasonic probe in 2% sodium dodecyl sulphate solution at pH 6.9. Proteins from a very weak flour, 'Israel M68' were even easier to solubilize using this procedure. The increased solubility of flour proteins by sonication, compared with simple stirring, was similar to that achieved by mixing flour dough in a mixograph. However, sonication is more efficient, and hence it required much less time (30 sec) to achieve complete extraction of proteins. Furthermore, a very small quantity of flour sample, equivalent to half an endosperm (11 mg), is required for the study of wheat seed proteins using sonication in combination with size-exclusion high-performance liquid chromatography. By this method, the total unreduced flour proteins were fractionated into

three distinct peaks of decreasing size range, representing mainly glutenin, gliadin, and albumin-globulin, resp. AS

77

Singh (NK), Donovan (R) and Mae Ritchie (F). **Use of sonication and size-exclusion high-performance liquid chromatography in the study of wheat flour proteins. II.** Relative quality of glutenin as a measure of breadmaking quality. *Cereal Chemistry* 67(2); 1990; 161-170

The unreduced total proteins were fractionated by SE-HPLC from 15 var. wheat cvs. into three fractions of predominantly polymeric glutenin, monomeric gliadins, and albumins/globulins, resp. The relative quantity of glutenin was highly positively correlated with loaf vol., extensograph dough resistance and extensibility, and mixograph peak development time. Also the absolute quantity of glutenin strongly correlated with extrusibility, farinograph DDT and negatively with dough breakdown. A very strong negative correlation was found between relative quantity of albumin/globulin and flour protein content. This method should provide a rapid small scale test with as little as flour as 11 mg (half an endosperm), for early sensation test for breadmaking quality in wheat breeding programmes. AR

Glutens

78

Perten (H). **Rapid measurement of wet gluten quality by the gluten index.** *Cereal Foods World* 35(4); 1990; 401-402

A new method is reported to measure the quality of gluten known as gluten index. The method has been found to be very well correlated to the swelling number values which is normally used to measure the quality and correlation coeff. has been found to be r = 0.96. The new method takes only 10 min as compared to 3 hr for swelling number. The optimum gluten index range for breadmaking is 60-90. PHR

79

Weipert (D). **Contribution to the assessment of some rheological properties of wheat gluten.** *Starch/Starke* 41(12); 1989; 476-483 (De).

The production of wheat gluten has increased considerably in the recent times and producers of vital gluten are searching for new markets and applications. Its main functional properties can be characterised by means of rheometry. Some possibilities offered by the empirical and basic rheometry in recording the viscosity and elasticity of rehydrated vital gluten and of vital and modified gluten dispersed in different solvents, are shown. Both, the properties of gluten and the ability of solvents in modifying the gluten, can be monitored. A standardised preparation of test samples and of carrying out the measurements is required for obtaining reliable measuring data. AS

MILLETS

Corn

80

Norred (WP), Bacon (CW), Porter (JK) and Voss (KA). **Inhibition of protein synthesis in rat primary hepatocytes by extracts of Fusarium moniliforme** contaminated corn. *Food and Chemical Toxicology* 28(2); 1990; 89-94

Mycological screening of two separate lots of corn samples that caused field cases of equine leukoencephalomalacia (ELEM) revealed heavy contamination with the fungus **Fusarium moniliforme**. Neutral and acidic fractions of a chloroform methanol (1:1, v/v) extract of the corn were evaluated for toxicity using rat primary hepatocytes. The extracts had little effect on the release of lactate dehydrogenase from the hepatocytes, and were without effect on unscheduled DNA synthesis, indicating low cell lethality and lack of genotoxicity. However, neutral extracts of the corn were found to contain potent inhibitors (S) of protein synthesis and measured by incorporation ^{3}H valine into the hepatocytes. When an isolate of **F. moniliforme** obtained from the corn samples or an isolate of **F. moniliforme** from South Africa that had previously been shown to cause ELEM (MRC 826) were grown on autoclaved seed corn, neutral extracts of the culture materials similarly inhibited protein synthesis. Whether the compounds responsible for inhibition of protein synthesis is associated with any of the toxic syndromes associated with **F. moniliforme** remains to be determined. The use of primary hepatocytes may be a useful bioassay for elucidating biologically active secondary metabolites of fungi. AS

Corn proteins

81

Behnke (U), Jurisova (E), Belajova (E), Haas (J) and Blumhagen (H). **Enzymatic hydrolysis of maize protein.** *Die Nahrung* 33(4); 1989; 361-376

Maize proteins are hydrolyzed by proteinases to a much less extent than soy, wheat, meat, fish or milk proteins. An industrial use of this process has not become known yet. Investigation with technical

maize gluten deal with the comparison of the enzymatic hydrolysis of maize and a wheat gluten and investigation of some functional properties of the hydrolyzates, the comparison of different proteinases, the influence of different kinds of pretreatment (HCl, α-amylase, heating) on the enzymatic proteolysis of the starch containing gluten samples and the estimation of mol. wt. distribution of maize gluten hydrolyzates. From the results it is obvious that the solubilities of maize gluten hydrolyzates are significantly less than those from wheat gluten with comparable degrees of hydrolysis. Special investigation on the solubilities and the distribution of mol. wt. reveal that preferably small peptides besides not or only little attacked proteins are proteins are found as hydrolysis products. Despite of using selected pretreatment methods the extent of hydrolysis can be increased only partly. AS

Sorghum

82

Erokakpan (OV) and Palmer (GH). **A simple diamylase procedure for the estimation of α-amylase and diastatic activity.** *Journal of the Institute of Brewing* 96(2); 1990; 89-91

A simple procedure to selectively determine the α-amylase activity in sorghum and barley malt is described. Both α and β-amylases were extracted from the commercial malts using acetate buffer and the diastatic activity of the extract was assayed with amylose as substrate, where as to a portion of extract aqueous-solution of mercuric chloride (10^{-3} mg/ml) was added to inhibit the β-amylase and the α-amylase was also assayed similar to diastatic activity. The test was conducted on 14 samples of commercial malts and there was a 98% and 96% correlation between results obtained by this method and recommended methods of Institute of Brewing for detn. of diastatic power and detrinizing unit. NGM

83

Ring (SH), Akingbala (JO) and Rooney (LW). **A study of factors affecting amylose content of sorghum determined by an automated method.** *Starch/Starke* 41(12); 1989; 457-461

Several factors affecting the amylose content of sorghum, as determined by an automated iodine-blue complex method, were evaluated. Isolation of starch reduced the optimum solubilization time of the endosperm starch by 36 h. Amylose as % of isolated starch was significantly greater than amylose as % in the endosperm. However, amylose as % of starch in endosperm ("apparent" amylose content) was highly significantly correlated (r = 0.79) with amylose as % of isolated starch ("true" amylose content) that it could be used for screening sorghum in a breeding program. Pericarp and testa colours significantly affected the measurable amylose of unpearled sorghum flour. The environment of growth and maturation of the grain also affected the amylose content of sorghum. AS

PULSES

Beans

84

Tezoto (SS) and Sgarbieri (VC). **Protein nutritive value of new cultivar o. bean (Phaseolus vulgaris** L.). *Journal of Agricultural and Food Chemistry* 38(4); 1990; 1152-1156

The objective of this paper was to report the proximate comp., amino acid profile, and protein nutritive value of a new cvs of dry bean ('Carioca 80'), which has been developed by crossing the Brazilian cvs 'Carioca' with the var. 'Cornell 49-242'. In addition to improved productivity and resistance to rust and anthracnosis, the new cvs presented methionine bioavailability of 57%, digestibility around 70%, and biological value from 75 to 80%. The limiting amino acid was methionine. Supplementation with 0.3% of methionine, on a protein basis, raised the biological value to 92%, superior to that of casein utilized as reference. The PER (protein efficiency ratio) at 10% dietary protein did not differ from that of cvs 'Carioca' and 'Aete'3' used in the PER assays for comparison, but at 21% bean protein the PER of 'Carioca 80' was 40% higher. AS

Black gram

85

Kawatra (BL) and Sukhdeep Kaur. **Availability of zinc from germinated, fermented and autoclaved blackgram (Phaseolus mungo)** in rats. *Die Nahrung* 33(4); 1989; 311-314

The availability of Zn in the autoclaved black-gram diet was better as compared to germinated, fermented and raw black-gram diets and this may be used to more destruction of phytate. AS

Chick peas

86

Hussain (B), Khan (S), Ismail (M) and Sattar (A). **Effect of roasting and autoclaving on phytic acid content of chick pea.** *Die Nahrung* 33(4); 1989; 345-348

Chick pea cvs 'CM-68', 'C-44', 'Kabuli', 'CM-72' and '6153' were analysed for phytic acid, phytate phosphorus and total phosphorus. The effect of roasting and autoclaving on these constituents of whole seed and cotyledon was determined. The data revealed that roasting and autoclaving significantly decreased (P 0.05) the phytic acid of chick pea cvs. Phytic acid of whole seed was reduced to a range value of 16-60% and 16-64% by roasting and autoclaving resp. depending upon the cvs. In the cotyledon, the phytic acid was reduced to a range value of 32-68% and 18-68% during roasting and autoclaving resp. Similar effect of these treatments was observed in phytate phosphorus however, total phosphorus was little effected. AS

Cowpeas

87

Ningsanond (S) and Ooraikul (B). **Use of red cowpea in the manufacture of some food products.** *Starch/Starke* 41(12); 1989; 452-457

Cowpea flour, starch and protein were successfully used as substituents in a wide range of food products, either as protein supplements or alternative ingredients. Acceptable soft buns were produced from ingredients in which wheat flour was substituted at the level of 10%, by wt. with dry- or wet-dehulled cowpea flour, or 20% with dry-milled cowpea protein fraction. Protein-fortified cookies of satisfactory sensory quality could be produced by replacing up to 50% by wt. of wheat flour in the recipe with either dry- or wet dehulled cowpea flour, or up to 35% with cowpea protein fraction. Acceptable emulsion-type sausage was produced by replacing 5% by wt., of its lean pork with dry-milled cowpea starch or protein fraction, or wet-dehulled cowpea flour, or 10% with dry-dehulled cowpea flour. Transparent noodles produced from wet-milled red cowpea starch has similar quality to those from mung bean starch. When cowpea flour or protein fraction was used as a substituent in the products, protein content of the products could increase by 4-72%. AS

Dry beans

88

Skierkowski (K), Gujska (E) and Khalil Khan. **Instrumental and sensory evaluation of textural properties of extrudates from blends of high starch/high protein fractions of dry beans.** *Journal of Food Science* 55(4); 1990; 1081-1083

A Wenger X5 single-screw extruder was used to produce bean extrudates from formulations modified by addition of high protein bean fraction or hull. The effect of process temp. was investigated. The higher the process temp., the lower was the sample stress and the higher the sensory score for crispness. Product processed below 121 C was unacceptable. Crispness was good for samples containing 13-16% protein or 17-21% fiber; outside these ranges the extrudates were too hard. Shear stress increased uniformly with increasing protein or fiber content. A satisfactory correlation was observed between sensory and instrumental test results for texture: the higher the shearing stress, the lower was the sensory score for crispness. As

Faba beans

89

McCurdy (SM) and Knipfel (JE). **Investigation of faba bean protein recovery and application to pilot scale processing.** *Journal of Food Science* 55(4); 1990; 1093-1094, 1101

Extraction and precipitation conditions were assessed for recovery of protein from dehulled faba bean flour on a lab. scale. 10 C versus 20 C extraction did not affect solubility of nitrogenous components. However, more were extracted at pH 9 or 10 than at pH 7. Tap water extracted slightly more nitrogenous materials than 0.3M NaCl. Study of pH 4.0 to 5.3 for protein precipitation showed a higher yield of protein was obtained at lower pH. However, apparently simultaneous precipitation of non proteinaceous material cause overall lower protein comp. of the isolates from lower pH. Pilot scale processing of dehulled faba bean flour produced an isolate which was 92.5% protein, and represented a yield of 48% of the original protein. AS

Lentils

90

Bhatty (RS). **Cooking quality and losses of phytic acid, calcium, magnesium and potassium of lentils soaked in different solutions.** *Canadian Institute of Food Science and Technology Journal* 22(5); 1989; 450-455

A good-cooking sample of Laird lentil (shear force 3.4 kg/g) was stored at low and high temp. and humidity, soaked in water at different temp., and in acetate buffer pH 5.0 under various conditions. The shear force increased, except when soaking the lentil in water at 25 C, changing good-cooking lentil to poor-cooking. The changes in shear force was accompanied by, in exp. 1 to 3, a 7.9 to 49.4% decrease in seed phytic acid (PA), 4.1 to 53.4% in P, 0 to 27.5% in Ca^{2+}, 6.5 to 63.7% in Mg^{2+}, and 18.9 to 79.4% in K^{+}. Boiling the lentil in water for 15 min followed by soaking in the acetate buffer or soaking in the buffer containing sodium fluoride, a phytase

inhibitor, lowered the increase in shear force, particularly the latter treatment. Soaking a poor-cooking sample of Laird lentil (shear force 5.2 kg/g) in the acetate buffer aggravated the poor-cooking condition, which was completely reversed on soaking in EDTA or sodium phytate solutions. The increase in shear force on soaking good and poor-cooking lentil samples in water or acetate buffer seemed largely due to a decrease in PA. Phytase activity was not detected in any of the soaked samples. AS

Lima beans

91

Aletor (VA). **Effect of dietary sub-lethal doses of lima bean lectin on relative organ weights, pancreatic and intestinal trypsin (EC 3.4.21.4) and chymotrypsin (EC 3.4.21.1) in the rat.** *Die Nahrung* 33(4); 1989; 355-360

The dietary implications of feeding sub-lethal doses of extracted and purified lectin from lima bean were assessed in weanling rats using changes in relative organ wt., pancreatic and intestinal trypsin and chymotrypsin activities as the response indices. Liver wt. decreased significantly (P 0.05) while the heart showed a slight but non-significant increase in response to dietary lectin levels. The kidneys, pancreas and spleen were not significantly affected by dietary lectin. Although the activities of the pancreatic enzymes tended, for the most part, to decrease with increasing dietary lectin, such decreases were not significant when compared with the control. Intestinal trypsin and chymotrypsin activities were significantly (P 0.05) decreased in the small intestine while the activity values in both the large intestine and caecum were relatively unaffected. Activities of both enzymes showed significant (P 0.05) negative quadratic relationship with dietary lectin levels in the small intestine as judged by the magnitude of the R^2 coeff. of multiple detn., of 0.77 and 0.76 for trypsin and chymotrypsin resp. AS

OILSEEDS AND NUTS

92

Mosse (J) and Heut (J-C). **Amino acid composition and nutritional score for ten cereals and six legumes or oilseeds.** *Sciences Des Aliments* 10(1); 1990; 151-173 (Fr).

Groundnuts

Groundnut butter

93

Muego (KF), Resurreccion (AVA) and Hung (Y-C). **Characterization of the textural properties of spreadable peanut based products.** *Journal of Texture Studies* 21(1); 1990; 61-73

Textural characteristics of two peanut butter samples and one peanut paste sample were determined using three instrumental methods and a texture profile panel. In Method A, a penetrometer with a cone-shaped probe attachement was used. Method B involved the use of a plunger attached to the crosshead of the Instron Universal Testing Machine. Method C was a modified texture profile analysis (TPA). Instrumental measures show that peanut paste was the hardest, exhibited the greatest adhesive force but the least time to break the peanut column, and was the least cohesive. All instrumental methods were acceptable but TPA provided more information than the two other methods in describing texture. The panel rated the paste as firmest, least adhesive, spread least on the tongue, least smooth, most grainy, and most difficult to swallow. Significant correlations were found between several instrumental measures and sensory characteristics. AS

Rapeseeds

94

Abu-Peasah (SP), Rubin (LJ) and Diosady (LL). **Grinding and detoxification of canola using a Szego mill-hydrocyclone combination.** *Canadian Institute of Food Science and Technology Journal* 22(5); 1989; 464-469

A process yielding a finely ground, low-glucosinolate canola meal using a semi-pilot-scale Szego mill combined with a hydrocyclone was investigated. A methanol solution containing 10% (w/v) ammonia and 5% (v/v) water was used as the medium for grinding. Compared with grinding with the Szego mill alone, the combined Szego mill-hydrocyclone unit produced a more uniform finely ground meal. The glucosinolate content of the meal was decreased to less than 1.8 MUM/g dry meal, and the polyphenol content was reduced by as much as 88%. The polar filtrate (obtained from the ground slurry), after being mixed with fresh methanol-ammonia solvent at a ratio (v/v) 2.6:1, was used in further grinding of fresh seed. The presence of methanol in the meal, prior to the solvent extraction of oil with hexane, enhanced the oil recovery. AS

95

Viden (I), Reblova (Z), Davidek (J) and Pokorny (J). **Changes of lipoprotein phospholipids during rapeseed processing.** *Die Nahrung* 33(4); 1989; 377-378

During rapeseed processing about 0.4-0.8% lipids are liberated from their bound form and extracted into expeller-pressed or extracted oils, increasing thus the yield in an oil processing plant, compared with the yield predicted on the basis of SOXHLET extraction. If the liberated lipids originated from lipoproteins denatured during processing, they would contain high percentage of phospholipids. AS

Safflowers

96
Bafor (M), Stobart (AK) and Stymne (S). **Properties of acylating enzymes in microsomal preparation from developing seeds of safflower (Carthamus tinctroius)** and turnip rape (**Brassica campestris**) and their ability to assemble cocoa butter type fats. *Journal of the American Oil Chemist's Society* 67(4); 1990; 217-225

Soybeans

97
Lim (BT), DeMan (JM), DeMan (L) and Buzzell (RI). **Yield and quality of tofu as affected by soybean and soymilk characteristics.** Calcium sulfate coagulant. *Journal of Food Science* 55(4); 1990; 1088-1092, 1111

Nine light hilum soybean (**Glycine max** (L.) Merr.) var. were used to study the characteristics of soybeans and soy milk that affect the yield and quality of tofu coagulated with calcium sulphate. The yield of tofu was not affected by the size of soybeans. Soybean var. high in protein, fat and P contents produce tofu with higher protein, fat and P contents. Two models for predicting the yield of tofu were proposed. According to model one, soy milk with higher pH and total solids gives a higher yield of tofu. According to model one, soy milk with higher pH and total solids gives a higher yield of tofu. According to model two, soybeans high in protein and ash and low in P give a higher yield of tofu. AS

Soy products

98
Wang CH) and Damodaran (S). **Thermal destruction of cysteine and cystine residues of soy protein under conditions of gelation.** *Journal of Food Science* 55(4); 1990; 1077-1079

Thermal destruction of cysteine and cystine residues of soy proteins was investigated under gelation conditions. Significant cysteine and cystine were lost as a function of heating time. The rate and extent of loss was affected by heating temp., pH, salt concn. and viscosity of the protein solution. Greatest effects were from heating temp., pH and viscosity. A significant amount was lost even at pH 7.0 at 100 C. Amino acid analysis revealed that thermal destruction of cysteine and cystine at high protein concn. and near neutral pH did not result in formation of lysinolanine. The results can be useful to preserve nutritional quality in thermal processing of soy proteins. AS

Soy milk

99
Okubo (K), Sone (K), Kosugi (T), Honma (T), Rokukawa (K) and Yano (A). **Protein nutritional values of Yu**(supernatant of coagulated soy milk) on **tofu** processing. Studies on **Yu** fraction as by-product on **tofu** processing. Part II. *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(1); 1990; 1-6 (Ja).

Supernatant of coagulated soy milk on **tofu** processing termen as **Yu** contained about 60% of proteins as solids. The **Yu** proteins are rich in polar amino acids especially lysine, S-containing amino acids and threonini as essential amino cids when compared with **tofu** and okara and the amino acid score being 61. From the feeding exp. on rats, the digestibility net protein utilization and biological value of **Yu** proteins were 86.0, 44.5, and 51.7 resp. with a negative protein efficiency ratio value of (-170). Therefore it was concluded that nitrogen metabolism in rats fed **Yu** fraction was normal but may contain some growth depressent factors. BHSR

TUBERS AND VEGETABLES

Onions

100
Shanthi (K) and Balakrishnan (R). **Effect of nitrogen, spacing and maleic hydrazide on yield, nutrient uptake, quality and storage of MDU 1 onion.** *Indian Journal of Horticulture* 46(4); 1989; 490-495

The exp. was conducted with 3 levels of N (30, 60 and 90 kg/ha) three spacings (45 x 5, 45 x 10 and 45 x 15 cm) and 3 levels of maleic hydrazide (MH) (no spray, 1000 p.p.m. and 2000 p.p.m.) application with onion (**Allium cepa** Var. Aggregatum) cv. MDU 1 at Tamilnadu Agricultural University, Madurai. In storage, 2000 p.p.m. of MH inhibited sprouting, rooting, rotting and also reduced the physiological loss in wt. of onion bulbs. At 150 days of storage the sprouting was 4.00%, rotting was 1.20%, rooting was nil and wt. loss was 15.00%. KAR

Beet roots

101

Im (J-S), Parkin (KL) and Von Elbe (JH). **Endogenous polyphenoloxidase activity associated with the "black ring" defect in canned beet (Beta vulgaris** L.) root slices. *Journal of Food Science* 55(4); 1990; 1043-1045, 1059

Discolouration of canned beet root slices resulted after 5-10 min exposure of beet roots to live steam, and subsequent incubation of slices in air at least 20 min. The "black ring" of discolouration moved radially toward the center of slice as time of steam-peeling was increased. Dipping slices (Prepared after steam-peeling) in solutions of inhibitors of PPO before incubation in air inhibited or prevented discolouration. Based on these data, thermal stability of PPO and POX, heat penetration profiles, and location of the discolouration zone, a model to explain discoloration was developed. AS

102

Parkin (KL) and Im (J-S). **Chemical and physical changes in beet (Beta vulgaris** L.) root tissue during simulated processing-relevance to the "black ring" defect in canned beets. *Journal of Food Science* 55(4); 1990; 1039-1041, 1053

Preheating slices of beet root tissue at 40 to 60 C led to a loss in tissue integrity indicated by higher leakage of electrolytes and endogenous pigments, and increases in water soluble pectin content. When tissue slices were incubated at 25 C for 1 hr after preheating at 50 to 60 C, reducing sugar increased. Incubation after preheating at 40 to 60 C resulted in decreased phenolic acid content. Endogenous polyphenoloxidase and peroxidase retained about 50% of their original activity after preheating for 5 min at 70 and 60 C, resp. These results bear relevance on the occurrence of the "black ring" defect in canned beets. AS

Carrots

103

Carlin (F), Nguyen-The (C), Hilbert (G) and Chambroy (Y). **Modified atmosphere packaging of fresh, "Ready-to-use" grated carrots in polymeric films.** *Journal of Food Science* 55(4); 1990; 1033-1038

Ready-to-use" grated carrots were packaged in different films (oxygen permeability from 950 to 22,000 cc/m^2/day/atm. at 25 C) and stored at 2, 6 or 10 C for 10 days. Gaseous atm. in packs and the following were monitored: lactic acid bacteria, yeast counts, exudate and K ion released, sugars, carotene, ethanol and lactic acid. The respiration rate of the packaged carrots was measured. Films with very low oxygen permeability resulted in anaerobic respiration, high leakage of K, and high lactic acid bacteria. With high-permeability films (between 10,000 and 20,000 cc/m^2 to the power 2/day/atm. at 25 C). Grated carrots showed aerobic respiration and retained good quality. At 10 C, in carrots packed in the most permeable film, sucrose decreased markedly during storage. The gas permeabilities required for packaging grated carrots were evaluated in relation to storage temp. AS

Cassava

Cassava flour

104

Abraham (TE), Sreedharan (VP) and Ramakrishna (SV). **Development of an alternate route for the hydrolysis of cassava flour.** *Starch/Starke* 41(12); 1989; 472-476

Moldy wheat bran as such is used as a source of amyloglucosidase enzyme (EC 3.2.1.3) in the hydrolysis of cassava flour. 92-94% of glucose was obtained in the hydrolysate after 16 h of hydrolysis. The process was found to be economical compared to the hydrolysis using commercially available liquid enzymes. AS

Potatoes

105

Barichello (V), Yada (RY), Coffin (RH) and Stanley (DW). **Respiratory enzyme activity in low temperature sweetening of susceptible and resistant potatoes.** *Journal of Food Science* 55(4); 1990; 1061-1063

During storage at 4 C and 12 C, a potato cv susceptible to chill-sweetening (Norchip) accumulated significantly (P less than or equal to 0.05) higher levels of sucrose, fructose and glucose than a potato selection resistant to chill-sweetening (ND 860-2). ND 860-2 tubers exhibited a significantly (P less than or equal to 0.05) higher respiration rate throughout storage, reflected in higher activities of phosphofructokinase (PFK), glucose-6-phosphate dehydrogenase (G6PDH) and 6-phosphogluconate dehydrogenase (6PGDH). Storage significantly (P less than or equal to 0.05) reduced respiration rate for both cvs. G6PDH showed no significant (P less than or equal to 0.05) difference in specific activity or V_{max} between 4 C and 12 C for either cv. However, Km decreased at 4 C for both cvs, possibly due to build up of substrate. AS

106

Borsa (J), Siemens (AJ) and Mazza (G). **Effects of gamma irradiation of sprout inhibition and processing quality of Norchip and Russet Burbank potatoes.** *Canadian Institute of Food Science and Technology Journal* 22(5); 1989; 491-495

107

Hageman (G), Hermans (R), Ten Hoor (F) and Klenjans (J). **Mutagenicity of deep-frying fat, and evaluation of urine mutagenicity after consumption of fried potatoes.** *Food and Chemical Toxicology* 28(2); 1990; 75-80

108

Rai (RD). **Studies on potato chips, flour and starch making by solar dehydration.** *Indian Food Packer* 44(4); 1990; 9-12

Suitability of potato (**Solanum tuberosum**) cv. ('K. Chandramukhi', 'K. Lauvkar', 'K. Sindhuri'; 'K. Alankar'; 'K. Chamatkar' and 'K. Jyoti') for chips and flour making by sun-drying has been evaluated. The tubers were peeled, sliced, and blanched in boiling water containing 0.5% potassium metabisulphite and the chips were sun-dried. The unpeeled potatoes were boiled in water containing 0.5% potassium metabisulphite, mashed and sun-dried, and the material was milled to get potato flour. Potato flour yield ranged between 20.4 and 24.7% and that of chips between 14.1 and 18.5% of the wt. of tubers processed cv. 'K. Sindhuri' gave max. yield of chips (18.5%) and flour (24.7%). Significant quantities (95-98%) of sugars were lost during chip-making by sun-drying which resulted in improvement of colour of the fried product. The yield of the flour was recovered as by-product per t of potato processed for chips var. with high DM gave higher yield of chips and the by-product starch. VKR

Potato starch

109

Barichello (V), Yada (RY), Coffin (RH) and Stanley (DW). **Low temperature sweetening in susceptibleand resistant potatoes:** Starch structure and composition. *Journal of Food Science* 55(4); 1990; 1054-1059

Starch isolated from ND 860-2 potatoes, which were resistant to chill-sweetening, had higher amylose and lower amylopectin as well as a higher crystallinity as compared to starch isolated from Norchip potatoes, which were susceptible to low temp. sweetening. ND 860-2 starch exhibited greater resistance to alpha-amylase attack and amorphous swelling as well as higher gelatinization temp. and onset swelling temp. than starch isolated from Norchip. Examination of starch granule structure using bright field light microscopy indicated crystalline concentric rings in ND 860-2 not seen in Norchip. Scanning electron microscopy of granules incubated with alpha-amylase indicated more intact ND 860-2 starch granules compared to Norchip. These data strongly suggest that starch granule comp. is a factor differentiating the low-temp. sweetening sensitive cv from the resistant potato seedling. AS

110

Sato (Y), Miyawaki (O), Yano (T), Ito (K) and Saeki (Y). **Application of the hot-wire technique to monitoring viscosity of a fluid in a nonbaffled agitated vessel.** *Journal of Food Engineering* 11(1); 1990; 93-102

The hot-wire technique was applied to the monitoring of the viscosity of a fluid in a nonbaffled agitated vessel. The behaviour of the hot-wire viscosity sensory placed vertically in the vessel was described well by the Kramers equation combined with the compound vortex model. The sensitivity of the sensor was found to be improved by increasing the heat flux from the hot wire. With this sensor, the change in the viscosity of a potato starch solution was monitored during hydrolysis by α-amylase. AS

Leafy vegetables

Alfalfa

111

Doullard (R) and Songvilay Kongphet (T). **Surface activity of maltosylated rubisco extracted from alfalfa.** *Sciences Des Aliments* 10(1); 1990; 175-187 (Fr).

Brussels sprouts

112

Bogaards (JJP), van Ommen (B), Falke (HE), Willems (MI) and van Bladeren (PJ). **Glutathione S-transferase subunit induction patterns of brussels sprouts, allyl isothiocyanate and goitrin in rat liver and small intestinal mucosa.** A new approach for the identification of inducing xenobiotics. *Food and Chemical Toxicology* 28(2); 1990; 81-88

Effects of Brussels sprouts (2.5-30%), allyl isothiocyanate (0.03 and 0.1%) and goitrin (0.02%), in the diet, on the glutathione S-transferase subunit

pattern in the liver and small intestinal mucosa of male Fisher rats were investigated. A statistically significant linear relationship was found between the amount of Brussels sprouts in the diet and the induction of glutathione S-transferase subunits in two exp. Increases in total activity of glutathione S-transferases towards 1-chloro-2,4-dinitrobenzene ranged from about 15% (2.5% Brussels sprouts in the diet) to 180% (30% Brussels sprouts in the diet) in the liver, and from 3%(2.5% Brussels sprouts) to 150% (30% Brussels sprouts) in the small intestinal mucosa. There were similar increase in the total amounts of glutathione S-transferase subunits. In the first exp., when the average sinigrin and progoitrin levels found in the sprouts were 1835 and 415 MU mol/kg, resp., subunit induction patterns in both the liver and the small intestinal mucosa were very similar to the pattern observed after feeding allyl isothiocyanate. In the second exp., when the average sinigrin level found in the sprouts was as low as the progoitrin level (both about 540 MU mol/kg), a goitrin-like induction pattern was observed. The most pronounced difference between the glutathione S-transferase subunit induction patterns due to administration of allyl isothiocyanate and goitrin is the much stronger enhancement of subunit 2 by allyl isothiocyanate. The induction patterns of both exp. indicate that in Brussels sprouts at least two compounds, probably allyl isothiocyanate and goitrin, are responsible for the induction of glutathione S-transferases. AS

Tomatoes

113

Rodrigo (M), Martinez (A), Sanchis (J), Trama (J) and Giner (V). **Determination of hot-fill-hold-cool process specifications for crushed tomatoes.** *Journal of Food Science* 55(4); 1990; 1029-1032, 1038

To establish continuous process specifications for hot-fill-hold-cool of crushed tomatoes, heat resistance parameters (D and Z) were determined for **Bacillus coagulans** (ATCC 8038) for a temp. range from 85 C to 108 C at two pH levels: 4.3 and 4.5. A required integrated sterilizing value "IS_{110}" of 1.56 min was calculated, given a value for D_{110} of 0.46 min for a product with a pH of 4.5. By a study of the inoculation of cans and of the distribution of residence times, 2.56 min was derived as the treatment holding period necessary to achieve the required IS_{110} value. AS

114

Zamponi (R), Chaves (A) and Anon (MM). **Influence of carbon dioxide on ethylene synthesis of tomato.** *Sciences Des Aliments* 10(1); 1990; 141-150

High carbon dioxide concn. (20%) at 25 C inhibited the development of the climacteric ethylene burst in tomato (**Lycopersicon esculentum** mill. Cv. Palatense) fruit. The return of fruits to air produced an increase in ethylene production. When pericarp discs were incubated under a carbon dioxide atm. at 25 C no effect of this gas on ethylene production was observed. When tomatoes were under an enriched carbon dicxide atm., it was observed that the ACC level remained nearly constant. The content of ACC did not differ from the controls (air) the first three days of storage but was significantly lower for longer exposure. On transfer to MACC content was similar to the one observed for ACC. The ACC-synthase activity was not affected by carbon dioxide (20%). However the wound induction of this enzyme was inhibited after 180 min. of carbon dioxide exposure (20%) at 25 C. AS

FRUITS

Aonla

115

Sanjay Pathak, Pathak (RK) and Singh (IS). **Effect of packing containers on losses of Aonla fruits during transportation.** *Indian Journal of Horticulture* 46(4); 1989; 468-469

Aonla (**Phyllanthus emblica** Linn.) fruits were packed in gunny bag, fibre carton, arhar basket and wooden boxes. News paper and polythene sheets were used in each case as cushioning material. They were transported initially for 34 km by bus up to the railway station point and then to Calcutta (840 km) and Bombay (1451 km) by rail which took 20-31 hr. resp. The wt. loss and bruised fruit % were noted during transportation. Of the 4 packaging containers packing in wooden crates with polythene liner showed min. damage or of physiological loss in wt. and bruishing. KAR

Apples

116

Burda (S), Oleszek (W) and Lee (CY). **Phenolic compounds and their changes in apples during maturation and cold storage.** *Journal of Agricultural and Food Chemistry* 38(4); 1990; 945-948

Phenolic compounds have been determined by HPLC on the flesh and skin of three apple cvs ('Golden Delicious', 'Empire', 'Rhode Island Greening') during maturation and cold storage. The main phenolic compounds in all three apple cvs were found to be epicatechin and procyanidin B2, rather than

chlorogenic acid which previously had been reported as the major phenolic compounds in apples. The concn. of individual phenolics in apple flesh decreased sharply during the early stage of development and then remained relatively constant during maturation and storage. There was a direct correlation between concn. of polyphenols in the flesh and in the skins. The tendency to brown decreased throughout the fruit development and maturation period. AS

117

Mc Lellan (MR), Blanpied GD) and Massey (LM). **Harvest date and CA storage management effects on quality of processed apple slices.** *Journal of Food Science* 55(4); 1990; 1046-1048

The effect of harvest date and various controlled atm. (CA) delays was studied on an apple slice production line. Harvest date interacted with delay in placing apples under CA conditions, causing dramatic softening of the blanched apple slices. The effect on the blanched slices was much greater than that on raw slices. Numerous process parameters including waste amounts and yields were notably affected by various treatment combinations. AS

118

Sapers (GM), Garzarella (L) and Pilizota (V). **Application of browning inhibitors to cut apple and potato by vacuum and pressure infiltration.** *Journal of Food Science* 55(4); 1990; 1049-1053

Vacuum and pressure infiltration were investigated as means of applying ascorbate or erythorbate-based enzymatic browning inhibitors to apple and potato cut surfaces. Apple plugs infiltrated at 34 kPa pressure showed more uniform uptake of treatment solution and less extensive water-logging than plugs vacuum-infiltrated at 169-980 mB. Delicious and Winesap plugs and dice gained 3-7 days of storage life at 4 C when treated by pressure infiltration, compared to dipping. However, infiltrated dice required dewatering by centrifugation or partial dehydration to prevent water-logging. Pressure infiltration at 108 kPa extended the life of potato plugs by 2-4 days, compared to dipping, but was ineffective with potato dice. AS

Bananas

119

Cano (PM), Marin (MA) and Fuster (C). **Freezing of banana slices.** Influence of maturity level and thermal treatment prior to freezing. *Journal of Food Science* 55(4); 1990; 1070-1072

Freezing preservation of banana (**Musa cavendishii**, var. enana) was investigated. Microwave treatment of banana slices at 650 watts for 2 min or immersion of whole peeled fruits in boiling water for 11 min followed by freezing at - 24 C inhibited colour deterioration in the frozen product. Treatments showed different effectiveness depending on the enzymatic system studied [Polyphenoloxidase (PPO) or peroxidase (POD)] and banana maturity level at the processing date. Blanching in boiling water yielded a good frozen product in which no darkening was observed. The proper stage of ripeness for processing of this banana cv was characterized by a firmness of 1.24 kg, a pulp/skin ratio of 1.30 and a green (70%)-yellow (30%) peel colour. AS

120

Saroja (S), Pushpa (A) and Shanthi (VP). **A study on the activity of selected enzymes in the ripenings of banana and guava.** *Indian Journal of Nutrition and Dietetics* 25(7); 1988; 207-211

Guava and banana fruits at half ripe, full ripe and over ripe stages were assayed for amylase, invertase, pectin esterase, polygalacturonase, acid phosphatase and polyphenol oxidase. In both the fruits invertase activity was high in full ripe stage. Polygalacturonase activity was high in over ripe stage and is responsible for softening of fruits. In banana, pectin esterase activity was max. in over ripe stage while in guava it was max. in full ripe stage. Acid phosphatase and polyphenol oxidase increased in both the fruits during ripening. It is suggested that harvest at half ripe stage would help maintain good quality and easy marketing of both the fruits. KAR

Kiwifruits

121

Perera (CO), Hallett (IC), Nguyen (TT) and Charles (JC). **Calcium oxalate crystals:** The irritant factor in kiwifruit. *Journal of Food Science* 55(4); 1990; 1066-1069, 1080

The cause of irritation in the mouth, when kiwifruit nectars and dried kiwifruit products are ingested, was investigated. Idioblast cells that contain raphide crystals of calcium oxalate were isolated from inner pericarp tissue of the fruit and studied by light and electron microscopy. An experienced panel of 9 judges detected an irritation from sweetened apple puree when isolated raphide crystals were incorporated at the rate of 30 mg oxalate/100g of puree. Sensory and microscopic studies showed evidence that the irritation was caused by sharp calcium oxalate crystals exposed during processing. AS

122

Varoquaux (P), Lecendre (I), Varoquaux (F) and Souty (M). **Change in firmness of kiwifruit after slicing.** *Sciences Des Aliments* 10(1); 1990; 127-139

Processing kiwifruit **Actinidia dellciosa** (A. chev) for "ready-to-use" production includes peeling and slicing. These mechanical stresses induce a rapid decrease in firmness of the slices. Softening, at least for the first day after slicing, follows an apparent first order mechanism. The activation energy of the phenomenon is 18.6 KJ $mole^{-1}$. The texture loss seems to be a consequence of the enzymatic breakdown of pectic substance. Slicing results in ethylene emission but does not increase kiwifruit polygalacturonase activity. The hydrolysis mechanisms of cell wall components after slicing differ from those involved in the normal maturation namely the solubilization of protopectins. AS

Mangoes

123

Khader (SRSA). **Delaying ripening by post-harvest treatment of gibberellic acid in mango.** *Indian Journal of Horticulture* 46(4); 1989; 444-448

Matured hard-green mango, var. 'Dashehari' harvested on 19th June 1987 was dipped in gibberellic acid (GA) for five min at 100, 200,. 400 and 600 mg/l and after drying packed in ventilated wooden cases lined with newspaper and stored at 38-42 C and assessed for quality after 5, 7 and 9 days. GA treatment delayed the ripening as judged by enzymic activity, total acidity, ascorbic acid content, physiological loss in wt. and chlorophyll content. GA at 200 mg/l delayed the ripening by 3 days over the untreated control. KAR

Oranges

124

Sidhu (MS) and Gill (KS). **Price-spread of blood-red malta in Punjab.** *Indian Horticulture* 34(3); 1989; 11-15

The price-spread for malta oranges produced in Punjab was analysed in markets of (i) Delhi, (ii) Ludhiana, (iii) Amritsar and (iv) Malout in Nov. 1979 and Nov. 1987. The producers share (%) in (i), (ii), (iii), (iv) was 19.86, 30.18, 21.56 and 43.88 in 1979 and 20.67, 31.00, 34.45, and 62.27 in 1987 resp. The contractors share in (i), (ii) and (iii) was 26.88, (-) 9.77, 2.11 for 1979 and 28.12, 7.27 and (-) 3.70 for 1987 resp. The retailers share was for (i), (ii), (iii) and (iv) was 15.74, 32.12, 19.86 and 33.61 for 1979 and was 24.16, 32.92, 37.50 and 19.37 for 1987 resp. The expenses incurred by contractor will be on watch and ward, harvesting, grading, packing, container, packing material, transportation, unloading, octroi, commission, interest on looked capital and miscellaneous costs. The retailer incurs expenditure on commission, sample, transportation and spoilage and wastage. When the orchards were leased out to the contractor the producer's share varied from 19.86 to 34.45% but when the orchard was retained by producer's their share was 43.88 to 62.27%. Suggestions have been given to improve the marketing system and to get better returns to the farmers. KAR

Papayas

125

Flath (RA), Light (DM), Jang (EB), Richard Mon (T) and John (JO). **Headspace examination of volatile emissions from ripening papaya (Carica papaya** L., 'Solo' variety). *Journal of Agricultural and Food Chemistry* 38(4); 1990; 1060-1063

Organic compounds released from intact papayas at each of four ripeness stages were concentrated by Tenax trapping-ether desorption and were identified by capillary gas chromatography-mass spectrometry. Linalool, benzyl isothiocyanate, and phenylacetonitrile were released in significant amounts at all four ripeness stages, but linalool production increased dramatically as the fruit progressed from one-fourth to full ripeness. Free benzyl isothiocyanate levels also increased with fruit ripening, but phenylacetonitrile release fluctuated across the four fruit stages, showing no clear correlation with ripeness. Numerous esters and monoterpenes were only detected in emissions from fully ripe fruit. In initial flight tunnel bioassays with Oriental fruit flies, ripe papaya emissions were found to enhance significantly the attractiveness and oviposition stimulation of a perforated yellow sphere fruit model. AS

Pineapples

126

Dasbiswas (S), Biswas (B) and Mitra (SK). **Effect of plant density on yield, fruit weight, canning ratio and quality of pineapple cv. Kew.** *Indian Food Packer* 44(4); 1990; 5-7

Optimal plant density for cultivation of pineapple 'Kew' var. in alluvial plains of West Bengal, India, was determined by conducting an exp. with plant population varying between 57,971 and 95,236/ha. Increasing the plant density from 57,971 to 86,956/ha, increased the fruit yield from 65.2 to 103.8 t/ha but further increase in plant population decreased the yield. The quality of fruit and canning ratio decreased with the increase in plant density.

The % of fruit juice yield, total soluble solids, total sugar, and sugar/acid ratio of fruits decreased while fruit acidity increased with the increase in plant density. VKR

Raisins

127

Vagenas (GK), Marinos-Kouris (D) and Saravacos (GD). **Thermal properties of raisins.** *Journal of Food Engineering* 11(2); 1990; 147-158

The thermal properties of sultana grapes and raisins were investigated in the moisture content range 14-80% (wet basis) near room temp. The density of the berries increased from 1080 to 1460 kg/m^3 as the grapes were dried, following the model of an ideal mixture of dry solids and water. The specific heat and the effective thermal conductivity of the raisins were found to vary linearly with the moisture content. The effective thermal conductivity did not change significantly in the temp. range 39-51 C and the porosity range 0.4-0.5 AS

Strawberries

128

Sharp (AK). **Air transport of strawberries from Australia.** Requirements and possibilities. *Food Australia* 41(5); 1989; 755-760

This paper reviews research into the effectiveness of low temp. and modified atm. in preserving the quality of strawberries during transport. Covers storage temp. modified atm., problems of storage in modified atm., techniques for producing modified atm., combinations of techniques, wt. loss, air transport, current practice in air transport, calculation of temp. change and recommendations. 31 references. BV

129

Wrolstad (RE), Skrede (G), Lea (P) and Enersen (G). **Influence of sugar on anthocyanin pigment stability in frozen strawberries.** *Journal of Food Science* 55(4); 1990; 1064-1065, 1072

Strawberries were individually quick-frozen (IQF) and packed with 10, 20 and 40% by wt. added sucrose. Samples were stored at -15 C for 3 yr and analyzed for: total monomeric anthocyanin pigment, polymeric colour, browning and colour density. To test the influence of thawing, half the samples were thawed and refrozen prior to analysis. One- and two-way analysis of variance (ANOVA) revealed that sucrose addition had a significant protective effect on anthocyanin pigment content and also retarded browning and polymeric colour formation. Thawing accelerated these colour degradative reactions. AS

CONFECTIONERY, STARCH AND SUGAR

Chocolates

Cocoa

130

Wong (MK), Dimick (PS) and Hammerstedt (RH). **Extraction and high performance liquid chromatographic enrichment of polyphenol oxidase from Theobroma cacao** seeds. *Journal of Food Science* 55(4); 1990; 1109-1111

Polyphenol oxidase (PPO) was extracted from cocoa beans and subsequently purified using ammonium sulphate precipitation followed by high performance liquid chromatography (HPLC) for enrichment. HPLC analysis was performed using hydrophobic interaction chromatography which resulted in a 6.5-fold enrichment and a 24.6% recovery of the enzyme. Enrichment was confirmed using polyacrylamide gel electrophoresis under nondenaturing conditions. Comparison of enzyme- and protein-stained electrophoretic gels revealed the presence of possible multiple molecular forms of PPO and the absence of non-enzymic contminating protein, indicating a rapid procedure of enzyme extraction and enrichment. AS

Starch

131

Kuhn (M), Elsner (G) and Graber (S). **Cooking extrusion of starch with hydrocolloids.** *Starch/Starke* 41(12); 1989; 467-471 (De).

Extrusion cooking of corn starch with the hydrocolloids, xanthan, gummi arabicum, galactomannan and carrageenan yields in the case of corn starch with 5-30% xanthan products of excellent properties. Until now a synergistic effect between xanthan and galactomannan in water solution has been described as an interaction of $beta$-1,4-linked chains of the both polysaccharides. Now it has been shown that cooperative linkage of $beta$-1,4-D-glucan-chains of xanthan with $alpha$-1,4-D-glucan-chains of starch take place also under the conditions of cooking extrusion process. Pressure and torque measurements, and calculation of specific energy dissipation point to an evident interaction which is dependant on the xanthan concn. High water binding capacities and interesting behaviour in viscosity mark those products as a suitable new class of hydrocolloids. AS

Sugar

132

Deffenbaugh (LB) and Walker (CE). **Use of the rapid-visco-analyzer to measure starch pasting properties. Part I.** Effect of sugars. *Starch/Starke* 41(12); 1989; 461-467

The rapid visco-analyzer (RVA) was used to measure the effects of dextrose, sucrose, corn syrup solids and polydextrose on maize, tapioca and wheat starch pasting properties. The addition, of 1 part sugar: 1 part starch tended to decrease peak viscosity, whereas peak viscosity increased at higher sugar concn. (up to 4 parts sugar: 1 part starch). Time to onset viscosity increase and time to peak viscosity increased as sugar concn. increased. Dextrose, sucrose and corn syrup solids increased the max. setback viscosity of the starches, but polydextrose reduced setback viscosity. As the mol. wt. of the sugars increased, the effects generally increased for maize and tapioca starches but not for wheat starch. Pasting property parameters measured in the RVA concurred with data obtained using other viscometers or by other techniques previously reported. The RVA is useful as an alternative tool for studying starch pasting properties and the effects of food ingredients on starch performance. AS

Sugarcane

133

Jayabal (V) and Chockalingam (S). **Effect of nitrogen, phosphate and magnesium on yield and quality of sugarcane.** *Indian Sugar* 40(3); 1990; 165-167

Field exp. were conducted at Sugarcane Research Station of Melalathur, Tamil Nadu Agricultural University with CoC 772 var. of sugarcane by applying N at 0, 125, 250 or 375 kg/ha, P at 0, 16, 32 or 48 kg/ha and Mg at 0, 20, 40 or 60 kg/ha. Yield increase was significant with 250 kg N, 32 kg phosphorus pentoxide and 20 kg megnesium sulphate/ha. The juice quality did not improve with N or Mg, but P at 32 kg/ha increased the CCS % to 12.7% when it was 12.2% for no P. KAR

Sugarcane juices

134

Solomon (S), Srivastava (KK), Bhatnagar (S) and Madan (VK). **Post-harvest changes in invertase activity and juice quality in sugarcane.** *Indian Sugar* 39(12); 1990; 895-899

The sugar losses in harvested cane due to sucrose inversion were accelerated after 72 h storage. Acid and neutral invertase activity increased abruptly after 72 h with simultaneous increase in reducing sugars; the neutral invertase activity decreased marginally after 216 h, but invertase activity increased upto 360 h. The total soluble solids in juice increased upto 360 h after harvest, but decrease was found in cane wt. (13.66%), extraction % (55.29 to 43.60%), CCS % (13.73 to 10.62 %) and purity. In another exp., sodium meta silicate (1000 mg/l), sodium lauryl sulphate 1000 mg/l, mercuric chloride 100 mg/l, sodium malonate 200 mg/l and cobalt chloride (?) along with a surfactant was applied twice as preharvest foliar spray at 3-day intervals. Only mercuric chloride and cobalt chloride controlled the invertase activity upto 20 days of storage of cane. Other chemicals were not effective. KAR

BAKERY PRODUCTS

Biscuits

135

Ranhotra (Gs), Gelroth (JA) and Astroth (K). **Fish oil added to biscuits is a potents hypolipidemic agent in hypercholesterolemic rats.** *Cereal Chemistry* 67(2); 1990; 213-216

The results of an eight-wk exp., using young rats as the test model, showed that a diet containing biscuits made with fish oil exerted a persistent and potent lowering effect on serum total cholesterol (CH) and triglyceride (TG) in hypercholesterolemic rats; initially, it also caused an increase in high-density lipoprotein CH. A diet of biscuits containing linseed oil also substantially lowered both serum total CH and TG levels in hypercholesterolemic rats, but less than the fish oil diet. The canola oil diet lowered total CH but not TG levels. The fish oil diet and, to a lesser extent, the linseed oil diet also lowered serum total CH in normocholesterolemic rats. AS

Bread

136

Berglund (PT), Shelton (DR) and Freeman (TP). **Comparison of two sample preparation procedures for low-temperature scanning electron microscopy of frozen bread dough.** *Cereal Chemistry* 67(2); 1990; 139-140

New developments in low-temp. scanning electron microscopy (LT-SEM) allow samples to be examined in a frozen, fully hydrated state. The effect of sample preparation procedure for LT-SEM on resulting ultrastructure of frozen bread dough is studied.

Frozen doughs that thawed during SEM preparation exhibited a reticular pattern that was not apparent when samples remained frozen. The procedure used for preparing samples to be examined by LT-SEM is critical in determining the ultrastructural nature of frozen products. AS

137

Persaud (JN), Faubion (JM) and Ponte (JGJr). **Dynamic rheological properties of bread crumb. II.** Effects of surfactants and reheating. *Cereal Chemistry* 67(2); 1990; 182-187

Dynamic testing detected differences in the rheological properties of bread crumb that had been heated to 80 C by conventional or microwave ovens. Both G' and loss tangent of crumbs aged up to 120 h and heated in a conventional oven were reduced to fresh bread values. Microwave heating did not fully reverse age-related changes in G', and the extent of reversal decreased as the age of the crumb at heating increased. The viscous component, G", and therefore the tangent, increased to levels higher than those of freshly baked bread. Further, as the microwave exposure time increased, the tangent continued to increase. This effect was not attributable to a higher amount of moisture loss than that occurring during conventional heating. During storage, G' of the bread crumb containing the surfactants sodium stearoyl lactylate and hydrated monoglyceride did not reflect the change in firmness measured by empirical, static compression tests. The loss tangent of the surfactant treated crumb remained equal to that of freshly baked bread throughout the aging period. This indicated that the empirically measured firmness was a composite of both the elastic and viscous properties of the material. Without shortening in the formula, G' of the crumb increased at a greater rate and to a greater extent than with shortening. It appears that the mechanism by which sodium stearoyl lactylate and hydrated monoglyceride reduce firmness is not the same as that by which shortening reduces it. AS

138

Rogers (DE), Doescher (LC) and Hoseney (RC). **Texture characteristics of reheated bread.** *Cereal Chemistry* 67(2); 1990; 188-191

Bread slices were reheated in a conventional oven, microwave oven, or steam chamber. Samples were evaluated for toughness subjectively and objectively, using a method developed for the Instron Universal Testing Machine. Toughness was not simply a function of moisture content of the bread after reheating, but rather depended upon the method of reheating. The solubility of gluten protein from bread and gluten balls was determined in 1% sodium dodecyl sulphate containing various amounts of mercaptoethanol. Steamed bread and gluten samples gave lower solubilities than did the other samples at low levels of mercaptoethanol, indicating that they were more highly cross-linked by disulphide bonds. AS

139

Torner (MJ), Bainotti (A), Martinez-Anaya (MA) and Benedito de Barber (C). **The microflora of the sour dough of wheat flour bread. XII.** Effect of freezing on the viability and functional properties in wheat flour doughs of microbial mass from lactic acid bacteria. *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 189(6); 1989; 554-558

This article deals with application of freezing, at -196 C (liquid nitrogen) with 10% skim milk, to the biomass of lactic acid bacteria, **L. brevis, L. plantarum, L. cellobiosus** and **Streptococcus faecium**, microorganisms isolated from Spanish wheat doughs (18-20). The influence of process and storage time at -30 C has been studied by the evaluating the viability of the biomass, and its biochemical and fermentative capabalities, and its bread making potential in wheat flour doughs. AS

Buns

140

Lang (CE) and Walker (CE). **Hard white and red winter wheat comparison in hamburger buns.** *Cereal Chemistry* 67(2); 1990; 197-201

This study was carried out to find out the possibility of using whole hard white wheat flour in the preparation of hamburger buns with increased fibre content. The results showed that the vol. of bun decreased with the increase in the incorporation of whole wheat. Similarly cracked and flaked wheats were added to create the effect of white wheat (without seriously affecting the colony upto 30% cracked wheat, 40% flaked wheat or 20% bran could be added to the formula by including vital gluten resp. on 18%, 10%, or 19% for retaining the control height. White wheat buns made with these formulations were lighter in colour than buns made with red wheat. The taste test panelists found a significant taste differences between the red wheat and white wheat buns. AR

Cakes

141

Freeman (TM). **Sweetening cakes and cake mixes with alitame.** *Cereal Foods World* 34(12); 1989; 1013-1015

Formulas and methods of preparations have been presented for a var. of alitame-sweetened cakes and cake mixes, including yellow, sponge, pound, chocolate-flavoured, and devils food cakes, and cake-type brownies. All had acceptability comparable to commercial sugar-sweetened cakes or brownies of similar type but contained one-third fewer calories than their full calorie counterparts with no added sugar. Shortening was used only in the brownie formulation. The use of alitame as a sweetener in cakes and cake mixes is awaiting regulatory approval. When this is granted, new marketing opportunities for reduced-calorie cakes should be available to bakers. AS

Cookies

142

Heist (J) and Cremer (ML). **Sensory quality and energy use for baking of molasses cookies prepared with bleached and unbleached flour and baked in infrared, forced air convection, and conventional deck ovens.** *Journal of Food Science* 55(4); 1990; 1095-1101

Cookies were prepared with bleached and unbleached flour, two formulas and baked in institutional deck, infrared and convection ovens to determine the effects on sensory qualities and energy for baking. Sensory qualities were evaluated by a trained panel and energy use with meters. Flour significantly (p 0.05) affected all characteristics except width of cracks; oven, all characteristics except top-grain score and number of cracks; and formula, all textural and most appearance but no flavour characteristics. Values were generally highest with bleached flour and the convection oven. Energy use in baking was greatest in the convection oven (p 0.05). AS

143

Ochi (T), Tsuchiya (K), Otsuka (Y), Aoyama (M), Maruyama (T) and Niiya (I). **Effects of tocopherols on deterioration of cookies blended of vegetables.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(1); 1990; 39-44

The effects of α-and γ-tocopherol (Toc) on deterioration of cookies blended of carrot or spinach were investigated. The stability wao evaluated on the basis of changes in peroxide value (PV) of the lipid fraction, colour flavour and the levels of β-carotene and chlorophylls after baking and storage at 40 C. PV of the carrot-blended cookie was very low after baking and storage for 8 months. Whereas, PV of the spinach-blended cookie was about 12 just after baking and rapidly rose during 5 months storage. The addition of δ-toc to cookie dough was effective to prevent deterioration of the cookies blended of carrot or spinach. However, addition of α-toc resulted in a remarkable increase in PV of both types of cookies. The loss of β-carotene in the cookies blended of carrot or spinach during baking and storage was inhibited by the addition of δ-Toc, but accelerated by that of α-toc. Such effect were also observed in the case of chlorophylls in the cookie blended of spinach. Colour and flavour of the cookies blended of carrot or spinach were deteriorated during storage. However, the deteriorations were inhibited by addition of δ-toc, but promoted by that of α-toc. AΣ

Crackers

144

Creighton (DW) and Hoseney (RC). **Use of Kramer shear cell to measure cracker dough properties.** *Cereal Chemistry* 67(2); 1990; 107-111

The physical properties of cracker doughs were measured using a Kramer shear cell on Instron universal testing machine. The peak force taken from the Instron universal testing machine curve appears to measure dough stiffness, and a shoulder force appears to be its function of dough elasticity on dough development. Flours differing in cracker baking quality showed different relationships of shoulder force at various sponge fermentation times. Flours that produced crackers with low stock heights had decreased force values at longer fermentation times. Conversely, flours that made poor quality crackers (high stack heights and wt.) gave increasing shoulder force with longer fermentation times. AR

145

Creighton (DW) and Hoseney (RC). **Use of Kramer shear cell to measure cracker flour quality.** *Cereal Chemistry* 67(2); 1990; 111-114

A method developed to measure the physical properties of a straight dough with the Kramer shear cell was used to estimate the baking performance of cracker flours. The procedure involved adjusting the pH of flour-water dough to 3.9 and allowing it to rest for 10 h. For soft wheat flours, correlation coeff. of 0.89 between shoulder force and cracker wt. and 0.87 between shoulder force and stack height were obtained. A modified procedure that inclued neutralizing the sponge, adding salt, and remixing gave much better reproducibility. For soft wheat flour, correlation coeff. of 0.97 between shoulder force and stack height and 0.87 between shoulder force and cracker wt. were obtained with the modified procedure. Although having more steps, the modified procedure was faster because of its much easier cleanup procedure. Hard wheat flours

or blends containing hard wheat gave much higher shoulder forces. AS

Noodles

146

Sugiyama (J), Kurokouchi (K) and Horiuch (H). **A system for measuring dynamic viscoelasticity of a small irregularly shaped sample.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(1); 1990; 61-67 (Ja).

A new system for measuring dynamic viscoelasticity has been developed. It is now possible to measure rapidly the properties of a small irregularly shaped sample such as a grain of cooked rice or a piece of noodle. The time dependence can also be investigated, because the sample is not destroyed. The sample is sandwiched between two plates which are a constant distance apart and vibrated in the shear direction by moving one of the plates. The other plate detects the response through the samples. To obtain the value of viscoelasticity independent of the sample size, one of the plates is made of a transparent acrylic board and the contact area between the samples and the transparent plate is measured by an image processing device with a monitor camera. Viscoelastic moduli G' and G" can be calculated from vibration applied and response of the sample, the sample thickness and the contact area. As an application to quality evaluation, the viscoelasticity of three kinds of cooked rice was measured in this system. The results of the measurement showed a tendency similar to those of sensory evaluation. AS

Pasta

147

Colonna (P), Barry (JL), Cloarec (D), Bornet (F), Gouilloud (S) and Jalmiche (JP). **Enzymic susceptibility of starch from pasta.** *Journal of Cereal Science* 11(1); 1990; 59-70

The aim of this work was to study the structural factors of pasta products that are responsible for their low glucose and insulin responses and incomplete intestinal absorption of starch in healthy subjects. Native starch extracted from durum wheat in the lab. was used as references. Starch granules in pasta of different sizes, cooked for different time periods, were completely gelatinized, as proved by differential scanning calorimetry and X-ray diffraction. Compared to native starch, susceptibility to α-amylase hydrolysis was always increased by cooking. Complete solubilization into oligosaccharides was obtained in 24 h for enzyme concn. higher than 600 nkat/ml with 17 mg starch per ml. Smaller pasta size and increased cooking time led to higher susceptibility. When pasta structure was destroyed by grinding, starch was solubilized completely in less than 30 min by α-amylase hydrolysis. Limited swelling of starch granules during cooking and encapsulation by the protein network were partly responsible for the slow amylolysis kinetics. An estimation of the susceptibility towards α-amylase of gelatinized starch products is proposed, based on the minimal concn. of α-amylase necessary to obtain the solubilization of the easily degradable fraction. AS

148

Pagani (MA), Resmini (P) and Dalbon (G). **Influence of the extrusion process on characteristics and structure of pasta.** *Food Microstructure* 8(2); 1989; 173-182

The effects of the kneading and forming process on pasta quality have been investigated. Using the same blend of wheat flour and keeping, mixing and drying conditions constant, three types of spaghetti were produced using the following three kneading and forming processes: A) kneading with a continuous press and forming by pressure-extrusion; B) kneading and forming by sheeting-rolls; C) kneading by hand and forming with sheeting rolls. These three processes impart different mechanical work on the dough. The three types of dried spaghetti exhibited differences in cooking requirements and in cooking quality. Spaghetti A) absorbed water more slowly and showed poor cooking quality. Spaghetti (B) and (C) had a shorter cooking time, no stickiness and good firmness after cooking. Spaghetti compactness seems to control water absorption during cooking, i.e., the greater the compactness, the longer the cooking time. Nevertheless, compactness does not explain differences in cooking quality. On the contrary, this characteristic is clearly related to the different organization of proteins, as transmission and scanning electron microscopy images revealed. In fact, both spaghetti (B) and (C) showed a compact and continuous protein network, probably as a consequence of the mild and ordered kneading obtained by the sheeting process. Spaghetti (A), produced by dough kneading implying strong mechanical streses, exhibited protein network breakage which may account for its poor cooking quality. The results of the present work indicate that industrial kneading and extrusion, as performed today in the continuous press, are unsuitable for making the best use of poor quality raw materials. The pressure-extrusion process requires technological innovations which could ensure spaghetti with cooking quality comparable to that produced in the traditional sheeting process as well as high productivity. AS

MILK AND DAIRY PRODUCTS

Milk

149

Berg (HE), Van Boekel (MAJS) and Jongen (WMF). **Heating milk:** A Study on Mutagenicity. *Journal of Food Science* 55(4); 1990; 1000-1003, 1017

The mutagenicity of heated milk and model systems was investigated by the Ames mutagenicity assay. Heating varied from pasteurization to in-bottle sterilization to ultra-high-temperature (UHT) heat-treatment. No mutagenic response was found in heated milk or model systems. Early Maillard reaction products formed in heated milk or milk-resembling model systems apparently did not show mutagenic activity in the Ames-test. Milk that was burnt to the pan was also investigated. Chloroform and ethanol extracts of this milk showed mutagenic activity. Evidence showed this was due to Maillard reaction products. The antimutagenic activity of casein, reported in earlier studies, was confirmed. AS

150

Casiragi (E), Lucisano (M) and Piazza (L). **Rennet coagulation of milk retentates. 1.** Effect of thermal and mechanical stresses associated with ultrafiltration. *Journal of Dairy Science* 42(10); 1989; 2452-2456

Effects of UF on clotting kinetics, curd hardening, and whey syneresis of raw and pasteurized milk were studied. Milk was subjected to thermal and mechanical stresses similar to those occuring in a UF plant. To isolate the effect of milk recirculation from those due to protein concn., a UF batch loop system similar to an industrial system was used. Recirculation was obtained returing both retentate and permeate to the feed tank. Mechanical and thermal stresses associated with UF treatment caused a slight reduction of curd hardness and a decrease in whey separation rate. These effects, however, were less marked than those induced by pasteurization or by an increase in protein concn. both of which are associated with practical UF of milk. AS

151

Kelly (BJ) and Potter (NN). **Dialyzable calcium from milk processed with soluble fiber-containing gums, thickeners, and cocoa.** *Journal of Food Science* 55(4); 1990; 1004-1007

Dialyzable Ca form 10% non fat dry milk (NFDM) processed with gums, thickeners and cocoa was determined following **in vitro** peptic-pancreatic digestion. Acidification to pH 4.2, heat pasteurization, or boiling for 30 min did not affect the % dialyzable Ca from 10% NFDM alone or in the presence of any of the additives tested. At a level of 1% carrageenen, gum arabic, gum karaya, and low-methoxyl pectin significantly decreased (p 0.05) and agar increased (p 0.001) % dialyzable Ca. Other gums and thickeners were without effect and viscosity of the food system did not correlate with % dialyzable Ca. Five per cent Dutch or natural process cocoa caused a one-third reduction in dialyzable Ca and 1% Dutch cocoa also produced a significant decrease. AS

152

Srilaorkul (S), Ozimek (L) and Stiles (ME). **Growth and activity of Lactobacillus lactis** ssp. cremoris in ultrafiltered milk. *Journal of Dairy Science* 72(10); 1989; 2435-2443

Ultrafiltration of milk modifies intrinsic conditions in a different way as compared to condensing. The effect of this method of concn. of growth characteristics of four strains of **Lactobacillus lactis** ssp. cremoris strains 103, 108 and 208 was determined. Though higher amount of lactic acid was produced the change in pH was smaller because of buffering effects. It was possible to overcome the effect of buffer capacity upto concn. factor 4 by use of increased innoculum size of strongly proteolytic strains. JSS

Milk products

153

Elliott (JM), de Haan (B) and Parkin (KL). **An improved liquid chromatographic method for the quantitative determination of free fatty acids in milk products.** *Journal of Dairy Science* 42(10); 1989; 2478-2482

An existing HPLC method for the quantitative detn. of the major free fatty acid (FFA) in milk fat was improved. Complete resolution of the p-bromophenacyl (PBP) ester derivatives of saturated and unsaturated FFA of acyl-chain length C4 to C18 was accomplished by gradient elution (60 to 100% acetonitrile in water) when the temp. of the reverse-phase column was maintained at 10 C. This allowed the detn. of all the major FFA in milk fat within a single chromatographic analysis. The improved method should save time in analysis of FFA in milk fat and also can be used to quantify the low concn. (78 to 270 MUM plus or minus 17%) of the major FFA (myristic, palmitic, stearic, and oleic acids) in fresh pasteurized milk and follow the time course of milk fat hydrolysis where low amounts of FFA are liberated. AS

154

Gilliland (SE). **Acidophilus milk products.** A review of potential benefits to consumers. *Journal of Dairy Science* 42(10); 1989; 2483-2494

This paper reviews in four sections the beneficiary effect of consuming **Lactobacillus acidophilus** fermented milk 1) control of intestinal infections, 2) carcinogenic activity, 3) improved lactose utilization, and 4) aid in controlling serum cholesterol levels. In the end author discusses the research needs on **L. acidophilus, B. bifidum,** and related organisms. JSS

155

Rohm (H). **Texture properties and overall quality of foods as implied by milk products.** *Deutsche Lebensmittel-Rundschau* 86(2); 1990; 47-52 (De).

Assessment of the hedonic quality of food materials is based upon and induced by sensory stimulus-response-interactions. Stimuli of the primary source are matched by various sensory modalities which together with psychophysiological patterns of behaviour result in an overall hedonic quality. Among the sensory acceptance factors texture properties play a decisive role, which depends both on the stimulating object and the test person himself. Psychological techniques such as word association tests with consumer panels as well as sensory texture profile analysis have been found useful elements for the detection and identification of texture properties of foods. AS

Cheese

156

Richard (J) and Labuza (TP). **Rapid determination of the water activity of some reference solutions, culture media, and cheese using a new instrument based on the dew-point method.** *Sciences Des Aliments* 10(1); 1990; 57-64

The precision and the accuracy of a new instrument for the measurement of the water activity, based on the dew-point method, was evaluated using reference solutions. This instrument was very simple in use and generally gave precise and relatively accurate results within less than two min. However a standard curve with solutions in the range of interest should be prepared if an accuracy in water activity less than 0.003 is required or to detect a possible shift of the instrument response. AS

Cottage cheese

157

Mackie (DA), Emmons (DB), Beckett (DC) and Elsaesser (JL). **Sensory and instrumental analyses of cottage cheese firmness.** *Canadian Institute of Food Science and Technology Journal* 22(5); 1989; 456-459

The firmness of 2% milk fat creamed cottage cheese was evaluated by sensory and instrumental analyses. Forty-one adult consumers evaluated the texture and overall acceptability of four cottage cheeses on a 9-point hedonic scale. They found no significant differences (P 0.05) among three of the samples in either texture or overall acceptability, while one sample was rated lower than the others. Instrumental measurement indicated a significant differences (P less than or equal to 0.05) in curd firmness among the samples. A ten-member lab. panel evaluated the degree of firmness of four cottage cheese samples using a 15 cm line scale anchored from "soft" to "firm". The panel was able to perceive a difference in firmness between samples corresponding to a 10% change in the instrumental reading. Results suggest that 2% milk fat creamed cottage cheese with a firmness between 25 and 35 g/cm wire would find consumer acceptability. AS

Milk powder

158

Sukhminder Singh) and Sharma (RS). **Oxidative stability of milk powders as influenced by antioxidants.** *Indian Food Packer* 44(4); 1990; 13-19

Milk powders are prone to oxidative deterioration on prolonged storage. The paper reviews the effectivity of gallic acid and its ester, BHA, nordihydroguaiaretic acid (NDGA), flavones as antioxidants, possibilities of extension of storage life of milk powders by adding ascorbyl palmitate, dodecyl gallate, citric acid, amino acids, citrus bioflavonoid, flavones, gallates, BHA, NDGA, Tween-60 and whey proteins. 23 references. KAR

Whey

Whey proteins

159

Katsuta (K). **Gelation of whey proteins.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(1); 1990; 73-81

Yoghurts

160

Kim (SS) and Bhowmik (SR). **Survival of lactic acid**

bacteria during spray drying of plain yoghurt. *Journal of Food Science* 55(4); 1990; 1008-1010, 1048

Survival of **Streptococcus salivarius** subsp. **Thermophilus** and **Lactobacillus debrueckii** subsp. **Bulgaricus** were determined under various processing conditions for spray-drying. Numbers of both microorganisms decreased with increased outlet or inlet air temp., and atomizing air pressure. Outlet air temp. was a major parameter affecting number of survivors. Suitable conditions were inlet air 160 C, outlet air 60 C, atomizing air pressure 98 kpa, hot air flow 0.28 m^3/ min, and feed temp. 30 C. Spray-dried yoghurt powder showed lower survival for **S. Thermophilus** and similar survival for **L. Bulgaricus** as compared to freeze-dried powder. AS

MEAT AND POULTRY

Meat

161

Johnson (RC), Muller (TS), Romans (JR), Costello (WJ) and Jones (KW). **Effects of algin/calcium and adipic acid concentration on muscle-juncture formation.** *Journal of Food Science* 55(4); 1990; 907-909, 914

Efficacy of a binding gel, containing various concn. of algin/calcium (ALG/Ca) and adipic acid (AD), between large meat pieces in both raw, refrigerated and cooked forms was examined. Functionality of the binding gel was based upon the ability to uniformly apply the gel solution and the binding capabilities of the gel. Optimum ALG/Ca concn. for easy application and production of max. juncture success and binding strength in both the raw and cooked states was determined. Juncture success and binding strength in both states were maximized and surface discolouration minimized with the theoretically ideal AD to Ca ion ratio (0.5:1.0). The results indicated that large muscle pieces might be adhesively bound by ALG/Ca/AD gels to produce structured products. AS

162

Kolodziejska (I), Skonieczny (I) and Rubin (LJ). **Malondialdehyde-nitrite interactions in meat and model systems.** *Journal of Food Science* 55(4); 1990; 925-928, 946

Nitrite retarded formation of carbonyl compounds in meat when added before cooking, but had no effect after cooking and storage even though the 2-thiobarbituric acid (TBA) number was very low due to reaction of malondialdehyde with nitrous acid. Although tripolyphosphate/ascorbate reacted similarly preventing formation of carbonyl compounds, they had no effect on the TBA number when added after cooking. In a model system, nitrite reacted with malondialdehyde at cooking. In a model system nitrite reacted with malondialdehyde at pH 1.3 at room temp. The percentage of reacting malondialdehyde decreased with higher pH and increased with nitrite concn. The reaction of malondialdehyde with nitrite yielded high-mol.-wt: products. Sulfanilamide prevented the reaction of malondialdehyde with nitrite, but only when added before nitrite. AS

163

San Miguel (RI), Kunkel (WC), Bridges (D) and Acton JC). **Protein quality of selected muscle foods as affected by the exchange of dietary wheat bran for cellulose.** *Journal of Food Science* 55(4); 1990; 885-887

The exchange of 8.4% neutral detergent fiber (NDF) of wheat bran for 8.3% NDF of cellulose in diets containing either beef, chicken, fish or casein as protein sources did not (P0.05) alter feed consumption, weight gain or energy intake in the protein efficiency ratio (PER) bioassay with weanling rats. Higher (P0.05) fecal nitrogen (N) protein source when wheat bran was exchanged for cellulose. The exchange also had no effect (P0.05) on PER or net protein ratio (NPR) of casein or fish protein or on NPR of chicken protein. However, PER and NPR of beef and PER for chicken were reduced (P0.05) when the dietary fiber was exchanged. AS

Beef

164

Anderson (ME) and Marshall (RT). **Reducing microbial populations on beef tissues:** Concentration and temperature of an acid mixture. *Journal of Food Science* 55(4); 1990; 903-905

165

Anjaneyulu (ASR), Lakshmanan (V), Sharma (N) and Kondaiah (N). **Buffalo meat production and meat quality.** A review. *Indian Food Packer* 44(4); 1990; 21-31

This review on buffalo meat production and meat quality with particular reference to India covers growth rate of male calves reared for meat production; carcass yield and its characteristics effect of conformation, age and castration on meat production and quality; composition; functional properties; palatability of buffalo meat; storage changes in meat; and the products from processed buffalo meat. It is concluded that buffaloes are good lean meat producers and the meat quality is

comparable to beef and is suitable for processed meat product manufacture. KAR

166
Burfoot (D) and Self (KP). **Predicting the heating times of beef joints.** *Journal of Food Engineering* 9(4); 1989; 251-274

167
Delaquis (PJ) and McCurdy (AR). **Colonization of beef muscle surfaces by Pseudomonas fluorescens** and **Pseudomonas fragi.** *Journal of Food Science* 55(4); 1990; 889-902, 905

168
Ensor (SA), Sofos (JN) and Schmidt (GR). **Effects of connective tissue on algin restructured beef.** *Journal of Food Science* 55(4); 1990; 911-913

169
Faustman (C) and Cassens (RG). **Influence of aerobic metmyoglobin reducing capacity on colour stability of beef.** *Journal of Food Science* 55(5); 1990; 1278-1279, 1283

170
Lee (LM), Hawrysh (ZJ), Jeremiah (LE) and Hardin (RT). **Shrouding, spray-chilling and vacuum-packaged aging effects on processing and eating quality attributes of beef.** *Journal of Food Science* 55(5); 1990; 1270-1273

171
Liu (CW), Huffman (DL), Egbert (WR) and Liu (MN). **Effects of trimming and added connective tissue on compositional physical and sensory properties of restructured pre-cooked beef roasts.** *Journal of Food Science* 55(5); 1990; 1258-1263

172
Massaki Hirose, Yuriko Nishizawa and Lee (JY). **Gelation of bovine serum albumin by glutathione.** *Journal of Food Science* 55(4); 1990; 915-917, 924

Bovine serum albumin (BSA) formed an opaque gel when incubated at 37 C with reduced glutathione (GSH). Gelation was highly dependent on concentration of GSH and PH, at 70 mM GSH and pH 8.2 BSA showed maximumgel hardness. Sodium dodecyl sulfate polyacrylamide gel electrophoresis and the number of protein sulfhydryls revealed that gelation involves reduction of intramolecular disulfides in BSA and subsequent cross-links through intermolecular protein disulfides. Gelation was strongly inhibited by high concentrations of salts; inhibitory effects were highly dependent on species of anions, but not cations. AS

173
Van Laack (RLJM) and Smulders (FJM). **Physical-chemical properties and cooking yield of hamburgers prepared from accelerated processed beef.** *Journal of Food Science* 55(5); 1990; 1268-1269, 1307

Beef patties

174
Berry (BW). **Changes in quality of all-beef and soy-extended patties as influenced by freezing rate, frozen storage temperature, and storage time.** *Journal of Food Science* 55(4); 1990; 893-897, 905

175
Brown (LM) and Zayas (JF). **Corn germ protein flour as an extender in broiled beef patties** *Journal of Food Science* 55(4); 1990; 888-892

Beef steaks

176
Johnson (RC), Romans (JR), Muller (TS), Costello (WJ) and Jones (KW). **Physical, chemical and sensory characteristics of four types of beef steaks.** *Journal of Food Science* 55(5); 1990; 1264-1267, 1273

177
Wheller (TL), Seideman (SC), Davis (GW) and Rolan (TL). **Effect of chloride salts and antioxidants on sensory and storage traits of restructured beef steaks.** *Journal of Food Science* 55(5); 1990; 1274-1277

Pork

178
Harmon (CJ), Ramsey (CB) and Davis (GW). **Effect of cooking method on consumer acceptance and composition of hot-processed pork loins.** *Journal of Animal Science* 68(1); 1990; 143-147

179
Lebepe (S), Molins (RA), Charoen (SP), Farrar IV (CH) and Skowronski (RP). **Changes in microflora and other characteristics of vaccum-packaged pork loins irradiated at 3.0 KGy.** *Journal of Food Science* 55(4); 1990; 918-924

180
Ockerman (HW) and Wu (YC). **Hot boning,**

tumbling, salt and chopping temperature effects on cooking yield and acceptability of emulsion-type pork sausage. *Journal of Food Science* 55(5); 1990; 1255-1257

Hot-boned or chilled pork with addition of 2% or 3% salt was used to prepare emulsion-type pork sausage. Different tumbling periods and a var. of chopping temp. were evaluated. Emulsifying capacity (EC), water-holding capacity (WHC), pH, total plate count (TPC) and organoleptic properties were determined. Hot boned pork with 3% added salt had higher EC, pH, WHC, cooking yield and lowere TPC than chilled meat samples with 2% added salt. As chopping temp. increased, WHC decreased and TPC increased. However, an intermediate chopping temp. of 12.8 C produced superior yields. AS

181

Ramsey (CB), Tribble (LF), Wu (C) and Lind (KD). **Effect of grains, marbling and sex on pork tenderness and composition.** *Journal of Animal Science* 68(1); 1990; 148-154

182

Shackelford (SD), Miller (MF), Haydon (KD) and Reagan (JO). **Evaluation of the physical, chemical and sensory properties of fermented summer sausage made from high-oleate pork.** *Journal of Food Science* 55(4); 1990; 937-941

Pigs

183

Prusa (KJ), Sebranek (JG), Love JA) and Miller LF). **Quality attributes of various processed meats from pigs treated with porcine somatotropin** *Journal of Food Science* 55(4); 1990; 929-931

Rabbit

184

Anthony Das (S) and Ramanathan (LA). **Dehydrated spiced rabbit meat mince.** *Indian Food Packer* 44(4); 1990; 33-36

The ingredients, processing condition and storage stability of dehydrated, spiced ready mix for rabbit meat mince has been reported. The extruded spiced mince were placed in the cross flow hot air drier. The dried product packed in paper foil polyethylene laminate pouches was stored at 20-37 C. The mince was analysed for proximate chem. comp. and microbiological status. The product has 4% moisture, 65% protein and 22% fat and it could be reconstituted in 10 min in boiling water. The product could be kept well for 3 months at 37 C and 6 months at 28 C. VKR

Products

Meat

185

Chakurov (M), Miteva (E), Trendafilova (Z) and Gadjeva (D). **Effects of some technologies of curing uncomminuted meat products on their flavour. Part 2.** Contents of carbonyl compounds and their relation to flavour. *Die Nahrung* 33(4); 1989; 339-343

Studies were made of carbonyl compounds and the flavour components of two types of uncomminuted pork products, loin and neck, manufactured by three technologies, I. brine curing, II, dry curing, and III, dry curing using 0.6% honey. Meat flavour was evaluated by a trained panel by the method of sensory profiles, using a 5 point scale. A considerable increase was found in the contents of total carbonyl compounds in the meat products manufactured by technology II, and particularly by technology III. The difference in monocarbonyl compounds and keto glycerides was significant. The data from the sensory analysis indicated a more intensive flavour in the latter meat products, which was particularly marked in the those made of loin. AS

186

Miteva (E), Trendafilova (Z) and Chakurov (M). **Effects of some technologies of curing uncomminuted meat products on their flavour. Part 1.** Changes in the contents of fatty acids as meat flavour precursors. *Die Nahrung* 33(4); 1989; 333-337

A study was made of the fattyacid comp. of phospholipids and the fraction of free fatty acids in two uncomminuted pork products, loin and neck, manufactured by three technologies: I brine curing; II dry curing; III, dry curing using 0.6% honey. A higher phospholipid content was found in the loin products. Brine curing caused a more intensive lipid hydrolysis in both types of meat products. The free fattyacid fraction in the meat products manufactured by technologies II and III was richer in unsaturated fatty acids, which are some of the most important meat flavour precursors. AS

Salami

187

Berger (RG), Macku (C), Bruce German (J) and Shibamoto (T). **Isolation and identification of dry salami volatiles.** *Journal of Food Science* 55(5);

1990; 1239-1242

The volatile constituents of air-dried, mold-fermented salami sausage were isolated from meat and casing using a dynamic headspace/continuous solvent extraction method. Apolar and polar fractions of the aroma conc., and a methylated acidic ether extract of the defatted meat were analyzed by high resolution gas chromatography and coupled gas chromatography-mass spectrometry. Most volatiles identified were derived from lipid degradation, from pepper (added as a spice), and from the degradation of pepper terpenes and phenolics. Neither typical intermediates of fatty acid autoxidation nor N-containing volatiles were among the 68 identified compounds. The contribution of lipid precursors was essential to overall flavour as were the microbial activities. AS

Poultry

188

Kondaiah (N). **Poultry meat and its place in meat market.** *Poultry Guide* 27(6); 1990; 41-45

Describes the development of poultry meat in India and its contribution to total meat production of the country. Also mentions the merits of poultry meat over other red meats; the market prospects for poultry prices and the scope for meat and the sufferings of farmers due to fluctuation in prices and the scope for marketing poultry products in the country. KAR

Chickens

189

Alvarez (VB), Smith (DM), Morgan (RG) and Booren (AM). **Restructuring of mechanically deboned chicken and nonmeat binders in a twin-screw extruder.** *Journal of Food Science* 55(4); 1990; 942-946

A twin-screw cooking extruder was used to restructure machanically deboned chicken (MDC) in combination with three nonmeat binders, corn starch (CS), soy protein isolate (SPI) and wheat gluten (WG), at concn. of 10-30%. Extrudates were evaluated by apparent tensile stress (ATS), Warner-Bratzler shear stress (WBSS), proximate compm. and reheat yield. SPI and WG were less effective than starch for increasing the ATS and WBSS of extruded MDC. The effects of die temperatures between 71-115 C on chem. and textural properties of extrudates containing 10% and 15% starch were investigated. The ATS and WBSS increased as a function of temp. up to 104 C. Fat content and lipid oxidation decreased as extrusion temp. increased. AS

190

Pikul (J) and Kummerow (FA). **Relative role of individual phospholipids on thiobarbituric acid reactive substances formation in chicken meat, skin and swine aorta.** *Journal of Food Science* 55(5); 1990; 1243-1248, 1254

Fatty acid profiles and distribution of individual phospholipids (PL) in the total PL were determined in chicken meat and skin and swine aortas, and the contribution of each PL to malondialdehyde (MDA) formation was studied. Results indicate that phosphatidyl choline (PC) and phosphatidyl ethanolamine (PE) produced 70-77% of the total PL MDA while 16-25% of the MDA was formed by phosphatidyl inositol (PI) and phosphatidyl serine (PS). Much lower concn. of MDA (3-6%) were formed by sphingomyelin (SP), cardiolipin (CL) and lysophosphatidyl choline (LyPC). In all analyzed tissues, both the MDA concn. and the percentage of polyenoic fatty acids, especially arachidonic acid, were highest in PI followed by PE, PS, PC, CL LyPC, and SP. AS

Broilers

191

Pai (KN). **Practical aspects of marketing broilers.** *Poultry Guide* 27(7); 1990; 43-48

The practical aspects in the marketing of broilers have been detailed which include the loss of wt. during processing and marketing due to shrinkage of broilers and methods to overcome it and the processing details for dressing of broilers including killing, bleeding and feather removal. The procedure for dressing and preparing the ready-to-cook broiler has been given in detail. KAR

192

Rajput (AM) and Goyal (ML). **Broiler raising is better than egg production.** *Poultry Guide* 27(7); 1990; 31-32

This article compares the demand and supply and the cost and return from broiler and egg production especially under tropical conditions. The net income from broiler production per rupee invested is Rs. 0.20 and from egg production it is 0.07 paise. KAR

Turkeys

193

Foegeding (EA). **Development of a test to predict gelation properties of raw turkey muscle proteins.** *Journal of Food Science* 55(4); 1990; 932-936, 941

A method for extraction and fractionation of muscle proteins into five fractions based on salt (NaCl) solubility were developed. The influence of protein extractability, solubility, muscle pH and total protein on gelation was investigated. Shear stress (gel strength) and shear strain (gel deformability) at failure of cooked (70 C) comminuted turkey breast gels were correlated with the 10 min protein extract and proteins soluble in 0.30-0.35M NaCl. Shear strain was correlated with muscle pH and shear stress was sensitive to total protein. Meat pH and the extraction/ fraction method can be used on raw meat to indicate functional properties related to texture of cooked meat. AS

194

Girard (B), Vanderstoep (J) and Richards (JF). **Characterization of the residual pink colour in cooked turkey breast and pork loin.** *Journal of Food Science* 55(5); 1990; 1249-1254

The residual redness was characterized in well cooked meat from turkey breast and pork loin. A simple method of scanning thin slices by transmission spectrophotometry was used to evaluate the meat pigments **in situ**. Absorption bands at 414, 520, and 550 nm of the spectra obtained from cooked meat led to the conclusion that residual pink colour was caused by cytochrome c. The method was further modified to study the effect of air contact on meat colour after cooking. Other pigments were spontaneously oxidized as soon as meat surface was exposed to air. The concn. of hemoproteins in turkey and pork were determined and found to be related to cooked meat colour. AS

Poultry products

Eggs

195

Mattern (EM), Kan (CA) and van Gend (HW). **An automated HPLC determination of meticlorpindol in eggs with UV absorbance detection, using on-line dialysis and pre-concentration as sample clean-up occurrence in and carry over to eggs.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(1); 1990; 25-30

196

Nageswara Rao.. **Identification of higher profitable months for egg productions in Andhra Pradesh.** *Poultry Guide* 27(7); 1990; 37-42

A study was undertaken to compute the changing incomes from egg production, during different months of a yr. The average retail egg prices were obtained from the poultry marketing centres of Chittoor, Cuddapah, Kurnool and Nellore district in Andhra Pradesh (India). % of egg production in different months of a yr were collected from 20 farms in and around Tirupati town of Andhra Pradesh (India). It was found that poultry farmers could get higher returns from sale of eggs in April or May and the returns will be lower in January and December. KAR

Egg whites

197

Kato (A), Ibrahim (HR), Watanabe (H), Honma (K) and Kobayashi (K). **Enthalpy of denaturation and surface functional properties of heated egg white proteins in the dry state.** *Journal of Food Science* 55(5); 1990; 1280-1283

The enthalpy of denaturation (δ H) and surface properties of proteins were related to elucidate the mechanisms of foaming and emulsifying properties by using various heated egg white proteins in the dry state. Foaming and emulsifying heated egg properties of all sample proteins were greatly increased with a decrease in the enthalpy of denaturation as determined by differential scanning calorimetry analysis. In plots, foaming and emulsifying properties correlated linearly with δ H values for various dry-heated egg white proteins. Thus, the enthalpy of denaturation of proteins seemed to be a significant structural factor governing surface functional properties. AS

Egg yolks

198

McCannel (A) and Nakai (S). **Isolation of egg yolk immunoglobulin-rich fractions using copper-loaded metal chelate interaction chromatography.** *Canadian Institute of Food Science and Technology Journal* 22(5); 1989; 487-490

Immunoglobulins were partially purified from egg yolk by metal chelate interaction chromatography (MCIC), after initial preparation of yolk with alginate precipitation. Under the phosphate-buffered equilibration conditions, chosen, chicken IgG did bind to the MCIC column when small sample sizes

were applied. With increasing amounts applied to the column, IgG was found to be preferentially displaced into the unbound fractions, resulting in an increase in IgG purity in the unbound. By selectively pooling the unbound fractions from a two-thirds copper-saturated 10 mL MCIC column, 104 mg IgG was obtained from four eggs at 75% purity. For industrial applications, the MCIC method described in the present study appears to have several advantages over current methods of yolk IgG separation. AS

SEAFOODS

199

Chung (KH) and Lee (CM). **Relationships between physicochemical properties of nonfish protein and textural properties of protein-incorporated surimi gel.** *Journal of Food Science* 55(4); 1990; 972-975, 988

The physicochemical properties of nonfish proteins were correlated with textural properties of nonfish protein gels and nonfish protein-incorporated surimi gels. Both cold and thermal hydration ability (by centrifugation) of nonfish proiteins strongly correlated with compressive force (cohesiveness) of nonfish protein-incorporated surimi gel (r = 0.94 for cold; r= 0.95 for thermal). Hydrophobic amino acid groups in nonfish protein inversely correlated with compressive force (r= -0.88) and penetration force (r= -0.78) of nonfish protein-incorporated surimi gel. Thermal behavior of nonfish protein affected the gel characteristics of nonfish protein and surimi with nonfish protein-incorporated. AS

200

Shimada (K) and Ogura (N). **Lipid changes in sea gonads during storage.** *Journal of Food Science* 55(4); 1990; 967-971

In lipids of salted sea urchin gonads, the changes in contents of neutral lipids (NL), glycolipids (GL) and phospholipids (PL), in peroxide and carbonyl values, in lipid class comp. of NL and PL, and in fatty acid comp. were investigated as a function of storage time. NL increased while GL and PL decreased by autolysis during 180 days storage. The increase of NL resulted from free fatty acids (FFA) [plus fatty acid ethyl esters (FAEE)] generated enzymatically by hydrolysis of PL and GL. Triglycerides were stable throughout a period of storage. In heat-treated and salted gonads, NL and GL and PL remained nearly unchanged during storage, and FFA and FAEE could not be detected. The oxidation of lipids was not detected during 180 days storage, although salted gonads had high content of polyunsaturated fatty acids. AS

Crabs

201

Botta (JR), Squires (BE) and Keats (SL). **Handling procedures and the quality of fresh raw snow crab (Chionoecetes opilio).** *Canadian Institute of Food Science and Technology Journal* 22(5); 1989; 470-474

A controlled study was conducted, under commercial conditions, to assess the effect of five different procedures of handling and storing snow crab on the open decks of fishing vessels. Upon arrival at the processing plant, crab, handled by the different methods, were assessed as lively, weak, critically weak, dead, or decomposed. Depending upon the day on which the crab were caught, the quality of crab stored in insulated containers with ice underneath false bottoms and with middle/top ice was significantly (P less than or equal to 0.05) superior to the quality of crab handled and stored using most of the other four methods. In addition, it was the only method which was not significantly affected by the day on which the crab was caught (89% to 97%) of the crab were lively and only 0% to 4% were dead/decomposed. AS

202

Matiella (JE) and Hsieh (TCY). **Analysis of crabmeat volatile compounds.** *Journal of Food Science* 55(4); 1990; 962-966

Boiled and pasteurized blue crab (**Callinectes sapidus**) meat samples were analysed for volatile flavour components by dynamic headspace sampling, capillary column gas chromatography and mass spectrometry. Fifty-three compounds were identified including aldehydes, ketones, alcohols, aromatics, furans, sulphur-containing compounds, terpenes, alkanes and miscellaneous compounds. Levels in both samples were compared and boiled crabmeat contained higher levels of most compounds. AS

Shellfish

203

Hwang (DF), Chuch (CH) and Jeng (SS). **Susceptibility of fish, crustacea and mollusc to tetrodotoxin and paralytic shellfish poison.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(2); 1990; 337-343

Marine and freshwater fish (20 Sp.), crustacean (13 sp.) and molluscs (19 sp.) were collected around and in Taiwan, and examined for susceptibility to tetrodotoxin (TIX) and paralytic shellfish poison (PSP). The min. lethal dose (MLD) of both toxins in

most fish were estimated to 10 MU/20 g body wt. on intraperitoneal and intramuscular administrations. Crustaceans (shrimps and crabs) showed the same susceptibility to either toxins. In contrast, most molluscs were much less susceptible to both toxins, with MLDs of TTX being 365 MU/20 g, and those of PSP being 300 MU/10 g, on intramuscular injection. AS

Shrimps

204

Huang (T-S), Chen (JS), Marshall (MR) and Wei (C). **Quantification of shrimp in shrimp-surimi mixtures using urea gel isoelectric focusing.** *Journal of Food Science* 55(5); 1990; 1206-1209

A method of quantitate and per cent content by wt. of shrimp in surimi-pink shrimp mixtures was developed by comparing peak areas of two Alaska pollock surimi-specific (pI 7.11 and 7.17) and two shrimp-specific (pI 5.46 and 5.52) protein bands on isoelectric focusing (IEF) gels. An equation describing the linear relationship between peak areas and protein from the standard samples of surimi, shrimp and surimi-peak shrimp mixtures was also developed. Using this method, unknown mixtures containing 10.0, 12.4 and 5.7% pink shrimp, resp.. were determined in blind studies to contain 8.3, 12.0 and 4.4% shrimp and 85.7, 86.8 and 92.7% surimi, resp. AS

205

Jaswal (AS). **Methodology investigations for the production of amino acid hydrolysate from shrimp waste.** *Canadian Institute of Food Science and Technology Journal* 22(5); 1989; 460-463

Various hydrolysis reaction conditions were examined in order to produce high quality hydrolysate from shrimp waste for its possible use in animal feed and some food products. In a first set of exp., shrimp waste was hydrolysed with varying concn. of HCl and samples taken after various hydrolysis times and tested for ninhydrin positive substances (NPS). Twelve h of hydrolysis with 5N HCl gave max. NPS yields and was, therefore, chosen as a suitable hydrolysing agent for subsequent hydrolysis trails. In a second set of exp., shrimp waste sample of varying wt. were hydrolysed with 5N HCl for various times and tested for NPS and total amino acids. On a dry wt. basis, amino acid contents of all 12 h hydrolysates varied from 29 to 35%. Max. yields varying from 32 to 37% were achieved when the hydrolysis time was increased to 24 h. Prolonging hydrolysis time to 48 h reduced amino acid yields by 15-20%. The amino acid contents decreased with an increase in sample wt. Of the total amino acid contents approx. 40-42% were essential amino acids with considerable amounts of lysine, valine, leucine and threonine. The remaining 58-60% non-essential amino acid fraction was dominated by glutamic and aspartic acids. AS

206

Shamshad (SI), Kher-Un-Nisa, Riaz (M), Zuberi (R) and Qadri (RB). **Shelf-life of shrimp (Penaeus merguiensis)** stored at different temperatures. *Journal of Food Science* 55(5); 1990; 1201-1205, 1242

The sensory, microbiological and biochemical changes were determined in shrimp (**Penaeus merguiensis**) stored at 0 to 35 C. Mean aerobic plate count of fresh shrimp, initially 5.0×10^5 CFU/g, increased with time and temp. to 6.4×10^9 CFU/g at 35 C after 24 hr. A total of 560 different bacteria were isolated and identified. In addition, the dominant organisms were tested for ability to reduce TMAO, produce indole and hydrolyze protein. The initial bacteria were 30% Gram + organisms but changed to predominantly Gram psychrotrophs at lower temp. and to mesophiles at higher temp. Odour, texture and colour qualities decreased; TMA, TVB, pH and Indole increased with time and temp. Shelf life of shrimp ranged from 7 hr at 35 C to 13 days at 0 C. AS

Fish

207

Krzymien (ME) and Elias (L). **Feasibility study on the determination of fish freshness by trimethylamine headspace analysis.** *Journal of Food Science* 55(5); 1990; 1228-1232

Trimethylamine (TMA) concn. in fish tissue is an accepted measure of deterioration. In this preliminary study a direct relation was demonstrated between TMA in the tissue and in the headspace above the fish flesh. A relatively simple but precise procedure was developed for measuring TMA headspace concn., based on air sampling with Carbotrap or Tenax sorbent tubes and subsequent thermal desorption and gas chromatography (GC) analysis. Sampling and analysis are completed in less than 5 min. Fish freshness determined by TMA headspace analysis was consistent with grading estimated by sensory tests, but the instrumental method provided a more objective and quantitative assessment of quality and an estimation of postmortem age of the fish. AS

208

Makinodan (Y) and Hijita (M). **Textural degradation of cooked fish meat gel (Kamaboko) by the addition of an edible mushroom, Judas' Ear.**

(**Auricularia auriculajudae** (Fr.) Quel). *Journal of Food Science* 55(4); 1990; 979-982

Commercial makers of kamaboko, a traditional Japanese preparation of gelled cooked fish meat, have observed that when slivers of the edible Judas' ear mushroom (**Auricularia auriculajudae** (Fr.) Quel) are incorporated into the gel without being cooked first, the gel tends to have an unsatisfactory texture. Exp. with casein as substrate have already shown that this mushroom has a proteinase. The proteinase acted on fish myofibrillar proteins, including myosin, actin, and tropomyosin. In kamaboko containing Judas' ear mushroom uncooked, fish proteins were hydrolyzed and gel strength was caused by the hydrolysis of fish proteins by the proteinase. AS

209

Surya Prakash Rao (V), Sudhakara (NS) and Setty (TMR). **Changing trend in fish utilisation.** *Seafood Export Journal* 22(5); 1990; 9-11

Albacore

210

Perez-Martin (RI), Gallarldo (JM), Banga (JR) and Casares (JJ). **Determination of thermal conductivity specific heat and thermal diffusivity of albacore (Thunnus alalunga).** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 189(6); 1989; 525-529

Thermal conductivity values of dried and raw albacore muscle were determined by means of a thermal conductivity probe. A microcalorimetric method and differential scanning calorimetry were used to obtain specific heat values of dried and raw muscle and of dried muscle, resp., at several temp. between 20 C and 150 C. Thermal diffusivity was calculated during precooking of headed and eviscerated albacore and during heat treatment of cylindrical cans filled with edible parts of precooked albacore. The experimental temp. curves were adjusted to those obtained from an analytical solution of the heat transmission equation assuming cylindrical geometry, conduction mechanism and constant thermal properties of the material. From experimental thermal conductivity, specific heat and density values, thermal diffusivity values of 1.43 x 10/ sup -7/ m^2/S with perpendicular heat flux to fibers and 1.65 x 10/ sup -7/m^2/ s with parallel heat flux were calculated for raw albacore. The values of apparent thermal diffusivity were found 1.51 x 10^{-7} m^2/s and 1.29 x 10^{-7} m^2/s during precooking and heat treatment of cans, resp. AS

Catfish

211

Nettleton (JA), Allen (WH), Klatt (LV), Ratnayake (WMN) and Ackman (RG). **Nutrients and chemical residues in one- to two-pond Mississippi farm-raised channel catfish (Ictalurus punctatus)** *Journal of Food Science* 55(4); 1990; 955-957

Composite samples of Mississippi farm-raised channel catfish (FRCC) fillets were analyzed at four different seasons for the following: proximate comp., cholesterol, fatty acids, eight vitamins, eleven minerals, four heavy metals and eight chemical residues. Nutrients and other compounds did not vary appreciably with season. Mississippi FRCC were higher in fat, calories and thiamin compared with USDA and wild catfish data and had much less cholesterol than previously reported. Monounsaturates comprised over half the fatty acids in FRCC and omega-3 fatty acid content was low. Chemical residues were not detectable or present in extremely small amounts. AS

Clam

212

Tanchotikul (U) and Hsieh (TC-Y). **Methodology for quantification of geosmin and levels in rangia clam (Rangia cuneata).** *Journal of Food Science* 55(5); 1990; 1233-1235, 1238

The concn. of geosmin was determined in freshly dredged and 2-wk relayed rangia clam (**Rangia cuneata**) samples in different seasons of the yr. Vaccum distillation/solvent extraction using an internal standard was followed by multiple-level standard addition gas chromatography/selective ion monitoring mass spectrometry. Most coeff. of variation were lower than 10%. On a dry-wt. basis, the geosmin level in dredged clams was highest (343 ng/g) in August and averaged 51.6 ng/g in other months. A 52% reduction of geosmin was found after two wk relaying during the period of May-June. However, only 1% reduction of geosmin was observed during February-March. AS

Cod

213

Simpson (BK), Simpson (MV) and Haard (NF). **Properties of trypsin from the pyloric ceca of Atlantic cod (Gadus morhua).** *Journal of Food Science* 55(4); 1990; 959-961, 971

Trypsin (EC 3.4, 21.4) was isolated from the pyloric ceca of Atlantic cod and purified to homogeneity by affinity chromatography. The enzyme catalyzed the hydrolysis of benzoyl arginine p-nitroanilide (BAPA,

pH 8.2 and 25 C) such that V_{max} was 250 BAPA units per micromole trypsin and K_m was 1.48mM. For the hydrolysis of tosylarginine methyl ester (TAME , pH 8.1 and 25 C), V_{max} was 18.2 x 10^3 TAME units/micromole trypsin, and K_m 0.22mM. The pH and temp. optima with BAPA substrate were 7.5 and 40 C. resp., Atlantic cod trypsin was most active and stable at alkaline pH. The enzyme was heat labile, losing more than 50% of its activity after trypsin revealed that the enzyme was rich in residues such as serine, glycine, glutamate and aspartate, but poor in basic amino acid residues compared to trypsins from warm blooded animals. AS

214

Sych (J), Lacroix (C), Adambounou (LT) and Castaigne (F). **Cryoprotective effects of some materials on cod-surimi proteins during frozen storage.** *Journal of Food Science* 55(5); 1990; 1222-1227, 1263

Freeze-induced protein denaturation of cod surimi was studied as affected by carbohydrates (sucrose and glucose syrup at 8% w/w), polyols, (sorbitol and glycerol at 8% w/w), protein hydrolysates (fish protein and casein hydrolysates at 4% w/w), hydrocolloids (pectin 1% w/w, sodium alginate, lambda-and iota-carrageenan-0.5% w/w) and combinations of the above, (sucrose/sorbitol 1:1 mixture at 8% w/w, or combined with protein hydrolysates at 4% w/w). Salt extractable protein (SEP) and heat induced denaturation by differential scanning calorimetry (DSC) were used to monitor protein changes in surimi stored 16 wk at -20 C. The best cryoprotection effect was achieved from sorbitol, glucose syrup (DE = 60), sucrose and sucrose/sorbitol 1:1 w/w mixture at 8% w/w in surimi. Correlations between certain DSC parameters and SEP were high. AS

Flat fish

215

Greene (DH), Babbitt (JK) and Reppond (KD). **Patterns of nucleotide catabolism as freshness indicators in flatfish from the Gulf of Alaska.** *Journal of Food Science* 55(5); 1990; 1236-1238

Hypoxanthine was the major catabolite of adenosine triphosphate (ATP) in rock, yellowfin, flathead and Dover soles examined from the Gulf of Alaska. Inosine monophosphate (IMP)/hypoxanthine (Hx) ratios were as effective as K_1 values for assessing freshness. In contrast, inosine (HxR) was the end catabolite in rex sole and hypoxanthine was barely detectable. The gradual accumulation of hypoxanthine in rock and yellowfin soles made this catabolite a useful freshness indicator for these sp. AS

Hoki

216

Macdonald (GA), Lelievre (J) and Wilson (NDC). **Strength of gels prepared from washed and unwashed minces of hoki (Macruronus nonvaezelandiae)** stored in ice. *Journal of Food Science* 55(4); 1990; 976-978, 982

Washed and unwashed fish minces were prepared from hoki that had been stored in ice. Gels were formed from the minces, cooked at both 60 C and 90 C and assessed by puncture, torsion and a folding test method. The strength of gels decreased as the fish were stored. However, after 10 days, the strength of gels made from hoki minces still compared favourably with gels made from other commercial fish species without storage. This suggests that manufacture of hoki surimi on-shore may be practical. Fish freshness as evaluated by sensory methods was closely related to the K value and gel strength. Hence K values might provide the basis of a raw material quality control system for an on-shore surimi plant. AS

Mackerels

217

Decker (EA) and Hultin (HO). **Factors influencing catalysis of lipid oxidation by the soluble fraction of mackerel muscle.** *Journal of Food Science* 55(4); 1990; 947-950, 953

Analysis of a soluble fraction (press juice) from mackerel muscle indicated 8% of the Fe and 7 to 38% of the Cu was associated with fractions with mol. wt. of 10 kilodaltons (KD). Storage of mackerel muscle resulted in an increase in 10 KD Fe but not Cu. Storing frozen-thawed muscle resulted in increase in both the 10 KD Fe and Cu. Storing mackerel resulted in decreased ascorbate and increased hemin in the press juice. Sepration of the press juice in to 5 KD and 5 KD fractions indicated both low and high mol. wt. components are required for maximal lipid oxidation in mackerel muscle. AS

218

Decker (EA) and Hultin (HO). **Nonenzymic catalysts of lipid oxidation in mackerel ordinary muscle.** *Journal of Food Science* 55(4); 1990; 951-953

Lipid oxidation catalyzed by the 5 kilodalton (KD) fraction of mackerel ordinary muscle was inhibited by ceruloplasmin and EDTA suggesting the involvement of metals. Removal of ascorbate from the soluble fraction of ordinary muscle decreased

ferric chloride stimulated lipid oxidation suggesting that ascorbate was capable of reducing metals in mackerel muscle. Components with spectral characteristics similar to hydrogen peroxide-activated hemoproteins were detected in aged mackerel muscle. Stimulation of lipid oxidation by ascorbate and a 150 KD fraction of ordinary muscle was inhibited by ceruloplasmin suggesting that Fe was released from ferritin. AS

Salmon

219

Ota (T), Sasaki (S), Abe (T) and Takagi (T). **Fatty acid composition of the lipids obtained from commercial salmon products.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(2); 1990; 323-327

The fatty acid comp. of total lipids from the raw fillets of four sp. of salmon, the salted fillet and the canned fillets from sockeye salmon were investigated by open tubular gas liquid chromatography. The major components of fatty acids of these samples were similar to those of masu salmon, pink salmon and chum salmon studied earlier. Food products of sockeye salmon had high content of 20:1 (n-11) and 22:1 (n -11 and n-13). The raw fillet of coho salmon had higher content of polyunsaturated fatty acids than the other samples. The content of 18:2 (n-6) in the raw fillets of rainbow trout and chinook salmon was apparently higher than those of other fish studied. It was inferred that these patterns of fatty acid comp. were influenced by the fatty acid patterns of dietary lipid. SGB

Threadfin bream

220

Lee (NH), Seki (N), Kato (N), Nakagawa (N), Terui (S) and Arai (K). **Gel forming ability and cross linking ability of myosin heavy chain in salted meat paste from threadfin bream.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkai-shi)* 56(2); 1990; 329-336

Changes in breaking strength of the salted meat paste from surimi of threadfin bream and in myosin heavy chain in it were investigated in connection with the temp. (10-60 C) for setting. The water holding capacity of kamaboko prepared from the salted paste through setting, followed by heating at 90 C, was also examined. The optimum temp. range for the increase in breaking strength of the salted paste, along with formation of cross-linked myosin heavy chain in it, was 20-30 C. The kamaboko prepared through setting at the optimum temp. exhibited high water holding ability. With the rise of temp. beyond 40 C, decrease in the breaking strength as well as the formation of cross-linked myosin heavy chain was remarkable, also at their temp. over 40 C, the kamaboko made from the salted paste suffered a higher drip loss along soluble proteins. The protein in the drip amounted to approx. 10% relative to myofibrillar protein content in the salted paste. SGB

Products

Sauces

221

Saneda (NG), Kurata (T) and Arakawa (N). **Overall quality and sensory acceptance of a lysine-fortified fish sauce.** *Journal of Food Science* 55(4); 1990; 983-988

The feasibility of making fish sauce with added lysine was studied. A difference was found in quality of the volatile compounds detected from the control and from the lysine-added samples. High concn. of lysine did not significantly affect acceptance due to aroma but reduced acceptance of flavour and colour. Addition of lysine could feasibly increase protein level of fish sauce. Sensory evaluation in terms of overall quality showed that addition of up to 2.0% lysine was quite acceptable. AS

Surimi

222

Wang (D-Q) and Kolbe (E). **Thermal conductivity of surimi - measurement and modeling.** *Journal of Food Science* 55(5); 1990; 1217-1221, 1254

To measure temp.-dependent thermal conductivity of surimi, a line-source probe system was developed. Effects of test conditions and sample history were investigated. Thermal conductivity of Alaska pollock surimi having 0, 4, 6, 8 and 12% cryoprotectant levels was measured in the range -40 to 30 C. Thermal conductivity of surimi has a relatively weak dependence upon cryoprotectant level when water content of the sample is controlled at 80.3%. From measured data, the Schwartzberg model and its modification were selected for future prediction. Three parameters in the model, T_i, B, and K_f had a linear variation with cryoprotectant concn. AS

223

Yoon (KS) and Lee (CM). **Cryoprotectant effects in surimi and surimi/mince-based extruded products.** *Journal of Food Science* 55(5); 1990; 1210-1216

The relative cryoprotective effects of liquid sorbitol

(L) alone and in combination with sucrose (L-S) was assessed in surimi, extruded uncooked and cooked products, and compared with the cryoprotective effects of crystalline sorbitol (C), liquid polyol (P), and modified starch (MS). Variables evaluated included gel-forming properties, cooking loss, drip loss and ice crystal formation. Addition of 8% sorbitol resulted in best water-holding ability, gel strength and least ice crystal formation. A better cryoprotective effect was shown in uncooked than in cooked products. No significant differences in effectiveness were found among C, C-S, L and L-S. Optimum sweetness was obtained with either C and L at 8% or L-S at 3.3%. Both C-S and L-S at 4:4% were judged to be slightly too sweet. AS

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

224

Corbonell (JV), Sendra (JM) and Todo (V). **Kinetics of β-glucan degradation in beer by exogenous β-glucanase treatment.** *Journal of the Institute of Brewing* 96(2); 1990; 81-84

Two samples of commercial $beta$-glucan preparations from fungal and bacterial source were studied for the β-glucan hydrolysis in barley beer. At 0 C and 5-20 p.p.m. concn. of enzymes it was found that β-glucan hydrolysis takes place in two stages. The assay of β-glucan was done by calceflour staining technique. To reduce the β-glucan content from about 600 p.p.m. level to the min. and optimum level fo 200 p.p.m., 40-6 p.p.m. of Filterage AM and 5-10 p.p.m. of Finizym 200L both fungal source and 5-20 p.p.m. of Biobeta P-100 bacterial source of β-glucanases were recommended. NGM

225

Sendra (JM) and Todo (V). **Determination of chloroacetic acid bromoacetic acid and iodoacetic acid in beer by microbore gas-liquid chromatography and electron capture detection.** *Journal of the Institute of Brewing* 96(2); 1990; 85-87

Malt

226

Drozd (J), Havlvoa (P) and Novak (V). **Quantitative evaluation of headspace determination of dimethyl sulphoxide malt.** *Journal of the Institute of Brewing* 96(2); 1990; 69-73

Dimethyl sulphoxide a volatile compound in malt was collected at the head space of ethanol water solvent system for malt. The headspace analysis based on gas-chromatographic technique was comparable to other classical methods of extraction procedures. Details of treatment to the sample and analytical conditions are dealt with in the paper. NGM

Wines

227

Fujinawa (S), Todoroki (H), Ohashi (N), Toda (J) and Terasaki (M). **Application of an acid urease to wine:** Determination of trace urea in wine. *Journal of Food Science* 55(4); 1990; 1018-1022, 1038

An improved method of urea detection having a sensitivity to 0.05 p.p.m., applicable to white wines, was developed by modifying Jansen's procedure. The urea concn. in many commercial bottled wines was found to be around 2 p.p.m. The method was utilized to the urea degradation by an acid urease which degraded naturally occurring urea of 0.5-2 p.p.m. at the same reaction rate as that for the spiked urea of 30 p.p.m. in the same white wine. Wine treatment with the acid urease also reduced ethyl carbamate formed by heating. AS

228

Hildenbrand (K), Christoph (N) and Bernreuther (A). **Present-day analytics of flavouring substances in official wine controlling and analytical characterization of wine defects.** *Deutsche Lebensmittel-Rundschau* 86(2); 1990; 39-44 (De).

HRGC and HRGC-MS methods are presented to analytically differentiate between natural and nature-identical flavouring substances in wine-holding beverages. By setting up a qualitative and quantitative inventory of characteristic flavouring substances and by determining the enantiomeric relation of chiral- γ-lactones through multi-dimensional gas chromatography and chiral capillary column. It is possible to identify nature-identical or isolatedly added substances. Methods to analytically characterize wine defects are presented, citing as an example quantitative styrene detn. by means of HRGC and photo ionization detector or by HRGC-MS. AS

229

Marce (RM), Calull (M), Guasch (J) and Borrull (F). **Determination of free amino acids in wine by HPLC using precolumn derivatization with**

phenylisothiocyanate. *American Journal of Enology and Viticulture* 40(3); 1989; 194-198

An analytical method for the detn. of free amino acids in wines is reported. It is based on their transformation into phenylthiocarbamyl derivatives. The derivatives were subjected to chromatography using an ODS column with a gradient elution program and ultraviolet detection. Prior to derivatization, two different clean-up methods of the sample were studied: the SEP-PAK C-18 system and a micropartition system. The method was applied to the study of variation of the amino acids during fermentation of sparkling wines. AS

230

Marti (M) and De La Torre (MC). **Determination of molecular weight of polysaccharides in musts and wines by HPLC.** *American Journal of Enology and Viticulture* 40(3); 1989; 221-223

A method is suggested for the detn. of the mol. wt. of polysaccharides in musts and wines using two columns connected in series. Good reproducibility of results was obtained in the analysis of musts and wines. AS

231

Moore (KJ) and Johnson (MG). **Preservation of wine must yeasts by drying on calcium alginate swabs.** *American Journal of Enology and Viticulture* 40(3); 1989; 214-218

A method for preserving yeasts by drying them on calcium alginate swabs was developed; 10 known pure yeast cultures and 10 yeasts recovered from fermenting musts were examined. With this preservation method, all 20 strains tested retained good viability when stored for nine months under refrigerated (4 C) or room temp. (25 C) conditions. Also, there were no changes in colony morphologies or pigment production for any of the 20 yeast cultures tested. Yeast fermentation and assimilation reactions, and abilities to grow without added vitamins were not affected by use of this preservation method. This method provides an easy, economical approach to a more long-term preservation of yeast cultures. AS

232

Murphey (JM), Powers (JR) and Spayd (SE). **Estimation of soluble protein concentration of white wines using Coomassie brilliant blue G-250.** *American Journal of Enology and Viticulture* 40(3); 1989; 189-193

233

Murphey (JM), Spayd (SE) and Powers (JP). **Effect of grape maturation of soluble protein characteristics of Gewurztraminer and White Riesling juice and wine.** *American Journal of Enology and Viticulture* 40(3); 1989; 199-207

Soluble protein in juice and wine increased with increasing grape maturity for both White Riesling (WR) and Gewurztraminer(GZ). It tended to decrease during fermentation. Protein retention in fermenting must was greatest pH 3.2. Regardless of maturity, GZ wines had six protein fractions in common which ranged in MW from 11000 to 69 500 daltons. The GZ wine fermented from the most ripe grapes (24.3% soluble solids) had an additional MW fraction at 41 200. Dependent upon grape maturity, WR wines had from four to seven protein fractions which ranged in mol. wt. from 12400 to 88100 daltons. GZ wines contained from eight to ten protein fractions which ranged in isoelectric point from 8.5 to 3.1. WR wines contained six to nine protein fractions which ranged in isoelectric point from 9.20 to 3.05. Wines from both cvs had protein fractions with isoelectric point at or below the wine pH. Residual soluble protein was found in all heat stabilized wines. The Coomassie Brilliant Blue G-250 assay, used in conjunction with bentonite fining trials, provided a suitable means for determining the max. amount of bentonite needed for removing the max. amount of soluble protein. AS

234

Ough (CS), Davenport (M) and Joseph (K). **Effects of certain vitamins on growth and fermentation rate of several commercial active dry wine yeasts.** *American Journal of Enology and Viticulture* 40(3); 1989; 208-213

Three commercial dry yeast preparations were used to study the effects of vitamins on growth and fermentation rates of model grape juice solutions under simulated wine making conditions. The yeasts used were **Saccharomyces cerevisiae**, Montrachet, Pasteur, and Epernay II. Certain vitamins or combinations of vitamins, including inositol, pantothenate, pyridoxine, thiamine, and biotin, were omitted or added at reduced levels. When certain vitamins were left out, the total viable cell counts were reduced. Omission of other vitamins had little effect. One of the more commonly used yeasts by the California wineries. **Saccharomyces cerevisiae** Montrachet, was most dependent on certain vitamins. Fermentation rates were also affected and not always in direct proportion to viable cell counts. Biotin was critical in improving the efficiency of fermentation, but at concn. lower than normal for grape juices. Similarly, pantothenic acid requirements were much less than normally present in natural grape juice. AS

235

Picque (D), Mollet (B), Perret (B) and Corrieu (G). **Automatic boiling meter for the measurement of ethanol concentration in wines and fermentation medium.** *Sciences Des Aliments* 10(1); 1990; 107-126 (Fr).

An automatic boiling meter for the measurement of ethanol concn. in wines and fermentation media is described. Comparatively with the standard boiling meter, the measurement of the boiling point of water and the use of the rule giving the correspondance between the difference of temp. and the alcoholic degree are suppressed. Several polynomial relationship are used to calculate the concn. of ethanol in dry, sweet wines or fermentation media. If standard ethanol solutions are used for the calibration of the boilingmeter the results for the measurement of the ethanol concn. in dry wines are higher of 0.5% of real concn. A calibration with standard solutions with the addition of potassium sulphate in order to take into account the effect of soluble components, gives the same relationship as the rule and good results for dry wines. The difference with the measurement by gas chromatography is less than 0.1%. For sweet wines, a relationship taking into account the amount of dry extract of the sample is used to calculate the ethanol concn. with a difference of 0.1%. A boilingmeter for on-line measurement of ethanol during fermentation has been developed. The relation to compute the ethanol concn., integrates the initial density of the must. At the beginning of the fermentation, a difference of 0.3% is recorded with the gas chromatography measurement. When the ethanol concn. increases, the difference decreases and becomes lower than 0.1%. AS

236

Tronton (D), Charpentier (M), Robillard (B), Calvayrac (R) and Duteurtre (B). **Evolution of the lipid contents of Champagne wine during the second fermentation of Saccharomyces cerevisiae.** *American Journal of Enology and Viticulture* 40(3); 1989; 175-182

During the second fermentation by **Saccharomyces cerevisiae** in Champagne wine, the neutral lipid comp. of the wine was greatly affected. The main characteristic of this process was the release of triacylglycerol from yeasts into the wine. Moreover, changes of the lipid contents resulted from multiple chem. reactions which occurred in wine, i.e., the degradation of both free fatty acids and diacylglycerols. The oxidation of triacylglycerol fatty acids (specifically on C-2 position of glycerol) and their release into the wine was an additional reaction; these peculiar fatty acids were rapidly degraded into smaller mol. which could have important organoleptic properties and thus partly modify the flavour of Champagne wine. AS

237

Wilker (KL) and Gallander (JF). **Comparison of Seyval blanc wines aged with air- and kiln-dried American white oak.** *American Journal of Enology and Viticulture* 40(3); 1989; 224-226

Seyval blanc wines aged with American oak chips from air- and kiln-dried wood staves were compared for nonflavonoid phenols and sensory characteristics. The wood staves were obtained from eight American white oak trees and were air- and kiln-dried. Although there was no significant treatment effect, the nonflavonoid phenols tended to be higher for wines aged with kiln-dried chips. The results of the sensory tests indicated that those wines with large differences in phenolic levels were detected by the taste panelists. AS

Non-alcoholic beverages

Coffee

238

Nishimura (O) and Mihara (S). **Investigation of 2-hydroxy-2-cyclopenten-1-ones in roasted coffee.** *Journal of Agricultural and Food Chemistry* 38(4); 1990; 1038-1041

The weakly acidic volatile components of roasted coffee were analyzed on a GC/MS. Fourteen 2-hydroxy-2-cyclopenten-1-ones were identified. Ten of these compounds are being reported for the first time in roasted coffee, trans- and cis-2-hydroxy-3,4,5-trimethyl-2-cyclopenten-1-on es as new compounds. Possible precursors of the 2-hydroxy-2-cyclopenten-1-ones are discussed. AS

Fruit juices

239

Chandler (BV). **Fruit juice review. 2.** *Food Australia* 41(12); 1989; 1101-1103

Covers raw materials, juice processing-general, citrus juices, and other juices, packaging and storage, chemical analysis and comp., fruit juice authentication and industries. BV

Apple juices

240

Ekasari (I),Jongen (WMF) and Pilnik (W). **Antimutagenic effects of apple juices:** Interference with heat load measurement by

microbiological methods. *Journal of Food Science* 55(4); 1990; 1026-1028

Whole heated clear apple juice subjected to a modified **Salmonella** mutagenicity assay did not show any mutagenic response. However, when fractionated, one fraction obtained from gel filtration did show a dose-related mutagenic response. This suggested the presence of antimutagenic factors. The Ames standard mutagenicity test was used to investigate the antimutagenic activity of apple juice samples against the direct acting mutagens nitroquinoline-N-oxide (NQO) and N-methyl-N'-nitro-N-nitrosoguanidine (MNNG). There was a dose and heat load dependent reduction in the mutagenicity of both mutagens, indicating the presence of antimutagenic factors. AS

Lime juices

241

Khurdiya (DS). **Lime-juice based carbonated drinks.** *Indian Horticulture* 34(3); 1989; 28-39

A simple method of juice extraction and preparation of carbonated drink from lime (**Citrus aurantifolia** Christm) has been described. The juice obtained from cut pieces and by grating after pressing in basket press was mixed, left overnight, the supernatant juice was mixed together, heat processed and filled in bottles. Lime juice syrup is prepared from this after mixing with sugar, and preserved by adding sodium benzoate (600 p.p.m.). Carbonation was done by filling 40 ml of lime juice syrup in a 200 ml capacity bottle and then filled with carbonated water (carbon dioxide gas at 100 p.s.i.) and crown corked immediately. From 300 kg of fruits 750 crates of bottles could be produced and the net profit will be Rs. 5400. KAR

Orange juices

242

Nisperos-Carriedo (MO) and Shaw (PE). **Comparison of volatile flavour components in fresh and processed orange juices.** *Journal of Agricultural and Food Chemistry* 38(4); 1990; 1048-1052

Fresh juice from Hamlin, Pineapple, and Valencia orange and different commercial brands of processed orange juices were analyzed for volatile flavour components by a headspace analysis technique. Twenty components including eight alcohols, four aldehydes, three esters, and five hydrocarbons were identified and quantified. Unpasteurized and pasteurized single-strength juices not made from concn. did not show marked changes in the profile of flavour components when compared to fresh juice. In contrast, pasteurized reconstituted juices from conc. showed decreases in acetaldehyde, methyl acetate, methyl butyrate, and ethyl butyrate with increases in decanal, octanal, and linalool. Aseptically packaged single-strength juice, canned juice, and a 10% juice drink exhibited increased α-terpineol. Canned juice and the 10% juice drink also exhibited low levels of ethyl butyrate, acetaldehyde, hexanal, and limonene and total disappearance of ethyl acetate. This procedure has potential for routine monitoring of quality of processed citrus products. AS

243

Parish (ME), Sadler (GD) and Wicker (L). **Viability of Lactobacillus plantarum** in orange juice under low pH and temperature conditions *Journal of Food Science* 55(4); 1990; 1023-1025

A strain of **Lactobacillus plantarum**, isolated from fermenting orange juice (OJ), was inoculated into unpasteurized or reconstituted OJ and held under low pH/low temp. conditions. Viability decreased more rapidly at subfreezing temp. near -5 C than at lower or higher temp. Viability decreased 0.37 log CFU/ML/hr at -6.6 C and 0.05 log CFU/ML/ hr at -18 C. Rates of population decrease in frozen samples at -5 C were about three times greater than in unfrozen samples at the same temp. An inverse linear relationship existed between rate of population decrease (log CFU/ML/day) at -7 C and OJ pH, with the rate of decrease at pH 4.1, about 1 log cycle lower than at pH 3.5 (0.024 and 0.60, resp.). AS

Raspberry juices

244

Rommel (A), Heatherbell (DA) and Wrolstad (RE). **Red raspberry juice and wine:** Effect of processing and storage on anthocyanin pigment composition, colour and appearance. *Journal of Food Science* 55(4); 1990; 1011-1017

Red raspberry wine was made from thawed fruit by fermentation of pulp, depectinized juice, and pasteurized depectinized juice. The influences of fining and storage were also investigated. The anthocyanin pigment profiles of the samples were determined by high performance liquid chromatography (HPLC), and additional colour indices by spectrophotometry and Hunter colorimetry. Anthocyanin pigments degraded mainly during fermentation, with total losses after storage of at least 50%. Cyanidin-3-glucoside was the most unstable anthocyanin disappearing completely during fermentation; cyanidin-3-sophoroside (the major anthocyanin)

was the most stable pigment. Pasteurized, depectinized wine that had undergone fining, had the most stable colour and best appearance after storage. AS

FATS AND OILS

Oils

245

Koseoglu (SS) and Engelgau (DE). **Membrane application and research in the edible oil industry.** An assessment. *Journal of the American Oil Chemist's Society* 67(4); 1990; 239-249

Commercial sources of edible oils and fats include oil seeds, fruit pulps, animals and fish. Oilseeds processing typically consists of the following steps i) seed preparation, ii) solvent extraction of flakes and/or extruded collects iii) desolventization of the meal, iv) recovery of solvent by distillation and v) degumming, refining, bleaching, and deodourizing of the crude oil. The process consumes large amounts of energy-in the forms of electricity, natural gas and fuel oils- to heat and cool the oil between individual processing steps and to generate high vacuum. Steam requirements for producing edible oil from crude oil range from 2000 to 4000 Btu/lb depending on the type of oil processed. The processing of cottonseed, corn, peanut and soybean oils alone consumes approx. 64.7 trillion Btu/yr of energy in the United States (based on 15.1×10^9 lb crude oil processed). Electricity requirements for a typical refinery are between 120, 000 kWh and 160,000 kWh/yr (based on 1400 to 1800 kWh/22,000 lb crude oil processed/hr). Current membrane separation research, as applied to miscella distillation; vapour recovery; condensate return; wastewater treatment; degumming, refining, and bleaching; hydrogenation catalyst recovery; oilseed proteins; and nitrogen production, is reviewed in this paper. The greatest potential for energy savings of 15 to 21 trillion Btu/yr exists in replacing or supplementing conventional degumming, refining, and bleaching processes. Decreased oil losses and decreased bleaching earth requirements are other potential advantages of membrane processing. Approx. 2 trillion Btu/yr could be saved using a hybrid membrane system to recover solvents in extraction of crude oils. Although marginal success has been reported to date, the development of hexane-resistant membranes may make this application viable. AS

Cottonseed oils

246

Krishnaiah (D) and Sarkar (S). **Kinetics of liquid phase hydrogenation of cottonseed oil with nickel catalyst.** *Journal of the American Oil Chemist's Society* 67(4); 1990; 233-238

The hydrogenation of cottonseed oil has been carried out in a batch reactor using both unmodified and chromia modified nickle catalysts. The process variables include chromium to nickel atomic ratio (0.00-0.35), catalyst particle size (200-400 micron), temp. (120-140 C) and pressure (5-10 bar). Chromia was found to suppress the stearate formation completely, although it retarded the overall hydrogenation activity of nickel. Its optimum content in the catalyst was found to be 0.17 Cr/Ni atomic ratio; the data corresponded to 5 h reaction time. The kinetics of the process was tested and found to follow a first order reaction with respect to linoleate and half order with respect to hydrogen. The activation energy was found to be 11.8 kcal/mole. AS

Palm oils

247

Das (NP) and Perera (TLA). **Effects of flavonoids on thermal autoxidation of palm oil.** Structure-activity relationships. *Journal of the American Oil Chemist's Society* 67(4); 1990; 255-258

The effects of flavonoids namely morin, kamempfenl, myricetin, quercetin, etc. and other known antioxidants on the thermal autoxidation of refined, bleached and deodourised palm oil were studied. The flavonoid aglycones were more potent in their anti peroxidative action than their corresponding glycosides. MNK

248

Goh (SH), Hew (NF), Ong (ASH), Choo (YM) and Brumby (S). **Tocotrienol from palm oil.** Electron spin resonance spectra of tocotrienoxyl radicals. *Journal of the American Oil Chemist's Society* 67(4); 1990; 250-254

The major vitamin E components present in palm oil, viz, α-tocopherol, α, γ- and lambda-tocotrienols, have been isolated and their structure verified by the NMR spectral of their acetate and succinate derivatives. Oxidation of γ and lambda-tocotrienols with alkaline potassium ferricyanide gave isolable dimeric sp., which were studied by ^{13}C NMR. Free radicals generated from the monomeric and dimeric tocotrienols were investigated using ESR spectroscopy. The distinction between antioxidant activity and antioxidant capacity of vitamin E isomers is discussed. AS

249

Nkpa (NN), Osanu (FC) and Arowolo (TA). **Effect of**

packaging materials on storage stability of crude palm oil. *Journal of the American Oil Chemist's Society* 67(4); 1990; 259-263

Lacquered metal cans, green glass bottles, amber glass bottles, clear glass bottles and clear plastic bottles filled with freshly produced Nigerian crude palm oil were stored in direct sunlight (40 plus or minus 1 C) and in the dark (27 plus or minus 1 C). Assessment of the stability of the oils towards hydrolytic and oxidative deterioration was made periodically by measuring the free fatty acid, peroxide and anisidine values over a period of 98 days. The study showed that crude palm oil packaged in plastic bottles and clear glass bottles recorded higher total oxidation values than oils packaged in either lacquered metal cans or amber and green glass bottles. Lacquered metal cans gave the greatest protection against oxidation. Oxidation proceeded faster in cases where the packaging materials were stored in direct sunlight. AS

SPICES AND CONDIMENTS

Nil

SENSORY EVALUATION

250

Ilker (R) and Szczesniak (AS). **Structural and chemical bases for texture of plant foodstuffs.** *Journal of Texture Studies* 21(1); 1990; 1-36

This review covers briefly plant morphology tissue organization and cell structure, the structure/texture relationship in edible plant materials with special emphasis on the role of cell wall and cytoplasmic components (starch, protein, lipids and vacuolar solutes). The review of published experimental data is supplemented with information deducible from interfacing the disciplines of plant physiology/microscopy and food science/texture. Recent engineering studies on tissue failure are discussed and their relevance to the advancement of the structure/texture relationship is pointed out. BV

251

Lima (M) and Shastry (SK). **Influence of fluid rheological properties and particle location on ultrasound-assisted heat transfer between liquid and particles.** *Journal of Food Science* 55(4); 1990; 1112-1115, 1119

Convective heat transfer between fluids and a particle was investigated as a function of fluid rheological properties and position in the ultrasonic field, expressed as dimensionless parameters. The convective heat transfer coeff. was determined for an irregularly shaped particle immersed in sodium carboxymethylcellulose solutions of various concn. The extent of sonic enhancement was strongly dependent on fluid rheological properties. At low viscosity, the distance of the particle to the nearest corner of the tank was found to be significantly correlated with heat transfer coeff.; this effect decreased as viscosity increased. Dimensionless correlations were developed. AS

252

Nussinovitch (A), Ak (MM), Normand (MD) and Peleg (M). **Characterization of gellan gels by uniaxial compression, stress relaxation and creep.** *Journal of Texture Studies* 21(1); 1990; 37-49

The rheological properties of 0.5-2.5% gellan gels were evaluated by uniaxial compression, stress relaxation and creep tests. The gel's strength was in the range of 0.1-1 kg cm^{-2} and their deformability modulus 1-6 kg cm^{-2}. The asymptotic modulus determined in relaxation tests at two strains and the asymptotic creep compliance determined under two loads indicated that gellan gels have a yielding structure. The strains sustained in creep were considerably higher than the failure strain in uniaxial compression. Wt. loss due to syneresis was on the order of 4-38% depending on the gum concn., the deformation level in relaxation or the load in the creep tests. AS

253

Nussinovitch (A) and Peleg (M). **Strength time relationships of agar and alginate gels.** *Journal of Texture Studies* 21(1); 1990; 51-60

The compressive strength of 2% agar and alginate gels was monitored periodically during the first 50-80 h after preparation. The strength increased rapidly in the first 6 h in the former and about 15 h in the latter, and then tended to stabilize, asymptotically. An empirical, two parameter mathematical model was used to estimate the asymptotic value on the basis of data obtained during the first 8 or 20 h, resp. The common procedure of testing these gels after 24 h is satisfactory, since changes after this time are relatively small. A similar two parameter model was also applied to the wt. loss of the alginate gels and it enabled prediction of the gel's final wt. with reasonable accuracy. Since both models can be presented in a linear form, testing their applicability and calculation of their constants can be done by linear regression. AS

254

Rohm (H) and Veit (V). **Adaption of sensory texture profile analysis. 2.** Geometrical and other

properties-basic texture profiles. *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 189(6); 1989; 544-549 (De).

To describe geometrical and other texture properties, an adequate selection of reference materials, accompained by a definition of textural terms, is necessary. Adaptation of terminology for semantic reasons is required, as well as consideration of regional habits of consumption. The work of a trained panel is testing some food materials, supported by discussion, resulted in a representative creation of texture terms and definitions. Basic texture profiles illustrate the successful transformation of texture profile analysis. AS

255

Rohm (H) and Veits (V). **Adaption of sensory texture profile analysis. 1.** Scaling of mechanical properties. *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 189(6); 1989; 538-543 (De).

Texture profile analysis, originally developed in the United States, represents the most complete system of both quantitative and qualitative sensory texture measurements of foodstuffs. Due to regionally varying habits of consumption, an adequate adaptation is necessary prior to application. This paper deals with the evaluation of the mechanical properties firmness, brittleness, chewiness, gumminess, viscosity and adhesiveness. Modifications of standard rating scales for typical Austrian food materials are reported. Rheological examination of commodities was followed by final establishment of standard scales with a trained panel. Good correlation between instrumental and sensory results was obtained. AS

FOOD STORAGE

256

Scott (EP) and Heldman (DR). **Simulation of temperature dependent quality deterioration in frozen foods.** *Journal of Food Engineering* 11(1); 1990; 43-65

Frozen food products may be exposed to fluctuating ambient conditions during storage, resulting in an increased loss of quality within the food products. The overall objective of this research was to develop one- and two-dimensional mathematical models to simulate transient temp. dependent quality deterioration within frozen food products subject to step changes in storage conditions. These mathematical models were developed using implicit finite difference schemes to determine transient temp. Quality loss was predicted assuming a limitting temp., dependent quality reaction rate. Temp. values predicted from the one- and two-dimensional models were compared with temp. measurements using a highly concentrated methyl-cellulose material as an analog food substance. Excellent agreement was found between predicted and experimental temp. for the situation with no internal packaging interfaces. Internal packaging boundaries were found to have a significant influence on the temp. differential within the analog food substance. The effects of step changes in storage temp. on quality loss were also demonstrated. AS

INFESTATION CONTROL AND PESTICIDES

Nil

BIOCHEMISTRY AND NUTRITION

Biochemistry

257

Lassek (E) and Montag (A). **Nucleic-acid components in carbohydrate-rich food.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(1); 1990; 17-21 (De).

The content of nucleic acid components in numerous foods, especially carbohydrate-rich ones, has been investigated. The data obtained for bases (purines and pyrimidines) were calculated as nucleic-acid equivalents (RNA or DNA); the IMP content was calculated from the measured content of hypoxanthine. Not only did cultivated plants such as cereals and pulses show a high RNA-equivalent content but also vegetables such as spinach, leek, broccoli, Chinese cabbage and cauliflower. The same results in mushrooms including oyster, flat, button (whitecaps) and cep mushrooms is found. In many vegetarian instant meals, the addition of autolysed or hydrolysed yeast caused a large increase in the purine content. Most natural foods which contain resting cell tissue, such as grains of seed, have only high-molecular-mass nucleic acid components with different concn.; however, growing cell tissue (e.g. soybean sprouts) show as well as the nucleic acids, some lower molecular-mass compounds. AS

258

Parvatham (R) and Shanthi (D). **The biochemical profile in chronic alcoholics before and after antabuse treatment.** *Indian Journal of Nutrition and Dietetics* 25(12); 1988; 365-371

The study was conducted with chronic alcoholics of forty five volunteers in 35-65 y age group and who were undergoing antabuse treatment. Treatment

with antabuse indicated normally in clotting time, bleeding time and platelet count; increase in total protein and albumin; not significant decrease in globulin level, significant decrease in γ-glutamyl transpeptidase activity and creative kinase levels, and prevalence of normal levels of sodium and potassium. KAR

259

Pie (JE), Spahis (K) and Seillan (C). **Evaluation of oxidative degradation of cholesterol in food and food ingredients.** *Journal of Agricultural and Food Chemistry* 38(4); 1990; 973-979 (Id).

Cholesterol oxidation derivatives display a wide range of undesirable biological properties, and their presence in foodstuffs has raised much concern and attention. A method allowing quick, simple, and reliable quantification of cholesterol oxidative degradation in food is developed. After lipid extraction and milk saponification, the unsaponifiable fractions from food samples are deposited on thin-layer chromatography plates and developed in hexane-ether (70:30); cholesterol oxides, migrating a single band, are resolved from cholesterol, and both areas are scraped and analyzed as trimethylsilyl derivatives by capillary gas chromatography. 19-Hydroxycholesterol and cholesterol are used as internal standards for the quantification of cholesterol oxides and of cholesterol, resp. The moderate heating of butter leads to the formation of cholesterol oxides, in amounts of increasing with temp., length of heating, and storage times. Cholesterol oxides are also present in commercial egg powder, egg mixes, and butter cookies or cakes. This method is a useful tool in assessing the quantitative importance of cholesterol oxides in the human diet and their formation during food processing or storing. AS

TOXICOLOGY

Nil

FOOD LAWS AND REGULATIONS

Nil

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